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CRPL-F 248 PART A

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PART A  
IONOSPHERIC DATA

ISSUED  
APRIL 1965

U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO



CRPL-F 248  
PART A

NATIONAL BUREAU OF STANDARDS  
CENTRAL RADIO PROPAGATION LABORATORY  
BOULDER, COLORADO

Issued  
22 April 1965

IONOSPHERIC DATA

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## IONOSPHERIC DATA

The CRPL-F series bulletins are issued as part of the responsibility of the Central Radio Propagation Laboratory for the exchange and distribution of ionospheric and related geophysical data. Part A, "Ionospheric Data," and Part B, "Solar-Geophysical Data," of the CRPL-F series present a variety of data collected by CRPL in the course of its research and service activities. Through the CRPL-F series, as part of the general exchange of scientific information, these data are made available for use by others in research on radio propagation and the ionosphere, and in other geophysical applications.

In the CRPL-F series, Part A, tables of monthly median values of vertical-incidence ionospheric data are presented accompanied by graphs of critical frequencies and M(3000)F2. The tables include the number of values entering into the median determination (count). When available, the upper and lower quartile values (indicated by UQ and LQ) are listed for foF2, foF1, foEs, M(3000)F2, h'F2 and h'F. Space limitations do not permit inclusion of quartile values for the other characteristics. The tables are prepared by machine methods and the graphs are plotted automatically.

The tables and graphs present the ionospheric data as received from the originating laboratory. Responsibility for the accuracy and reliability of the data rests entirely with the originator. Medians of data for the U.S. stations are computed by CRPL in accordance with the recommendations of the World-Wide Soundings Committee.

Data will appear in the F-series, Part A, only when the complete daily-hourly tabulations have been received by the CRPL or the World Data Center A for Airglow and Ionosphere. In general, priority of publication is given to the most current data. Data received too long after the month of observation may experience an indefinitely prolonged delay before finding space in the F series, Part A.

Information on symbols, terminology and conventions may be found in the "URSI Handbook of Ionogram Interpretation and Reduction of the World-Wide Soundings Committee," edited by W. R. Piggott and K. Rawer (Elsevier, 1961), which supersedes previous documents. A list of symbols is available from CRPL on request.

### Units and Abbreviations of Ionospheric Data Tables

foF2, foEs - - - Tenths of a megacycle	MED - Median
foF1, foE - - - Hundredths of a megacycle	CNT - Count
h'F2, h'F, h'E - Kilometers	UQ - Upper Quartile
M(3000)F2 - - - Hundredths	LQ - Lower Quartile

Key to Points of Ionospheric Data Graphs

foF2: x                      foE : ○                      M(3000)F2 : ◇  
foF1: Δ                      foEs: +

< Less-than value indicated.                      > Greater-than value indicated.  
- - - Interpolated value indicated.

The following table contains the latest available information on twelve-month smoothed average of observed Zurich relative sunspot numbers, beginning with the minimum of April 1954. Final numbers are listed through June 1964, the succeeding values being based on provisional data.

Smoothed Observed Zurich Relative Sunspot Number

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1954				3	4	4	5	7	8	8	10	12
1955	14	16	19	23	29	35	40	46	55	64	73	81
1956	89	98	109	119	127	137	146	150	151	156	160	164
1957	170	172	174	181	186	188	191	194	197	200	201	200
1958	199	201	201	197	191	187	185	185	184	182	181	180
1959	179	177	174	169	165	161	156	151	146	141	137	132
1960	129	125	122	120	117	114	109	102	98	93	88	84
1961	80	75	69	64	60	56	53	52	52	51	50	49
1962	45	42	40	39	39	38	37	35	33	31	30	30
1963	29	30	30	29	29	28	28	27	27	26	24	21
1964	20	18	15	13	11	10	10	10	10			

## WORLD - WIDE SOURCES OF IONOSPHERIC DATA

THE IONOSPHERIC DATA PRESENTED IN THE 100 TABLES AND GRAPHS OF THIS ISSUE WERE ASSEMBLED BY THE CENTRAL RADIO PROPAGATION LABORATORY FOR ANALYSIS, CORRELATION, AND DISTRIBUTION. THE FOLLOWING ARE THE SOURCES OF THE DATA.

COMMONWEALTH OF AUSTRALIA, DEPARTMENT OF THE INTERIOR  
COCOS IS.

AUSTRALIAN DEFENCE SCIENTIFIC SERVICE  
WEAPONS RESEARCH ESTABLISHMENT, DEPARTMENT OF SUPPLY  
WOOMERA, AUSTRALIA

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DOURBES, BELGIUM

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TAIPEI (TAIWAN), CHINA

METEOROLOGICAL SERVICE OF CONGO  
LEOPOLDVILLE, CONGO

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INDIAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH,  
RADIO RESEARCH COMMITTEE, NEW DELHI, INDIA -  
KODAIKANAL, INDIA (INDIA METEOROLOGICAL DEPARTMENT)

IONOSPHERIC OBSERVATORY, INSTITUTE OF GEOPHYSICS,  
TEHRAN, IRAN

NATIONAL INSTITUTE OF GEOPHYSICS, CITY UNIVERSITY, ROME, ITALY  
ROME, ITALY

MINISTRY OF POSTS AND TELECOMMUNICATIONS, RADIO RESEARCH  
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WAKKANAI, JAPAN  
YAMAGAWA, JAPAN

GENERAL DIRECTORATE OF TELECOMMUNICATIONS, MEXICO  
EL CERILLO, MEXICO

THE ROYAL NETHERLANDS METEOROLOGICAL INSTITUTE  
DE BILT, NETHERLANDS

CHRISTCHURCH GEOPHYSICAL OBSERVATORY, NEW ZEALAND DEPARTMENT OF  
SCIENTIFIC AND INDUSTRIAL RESEARCH  
GODLEY HEAD (CHRISTCHURCH), N.Z.  
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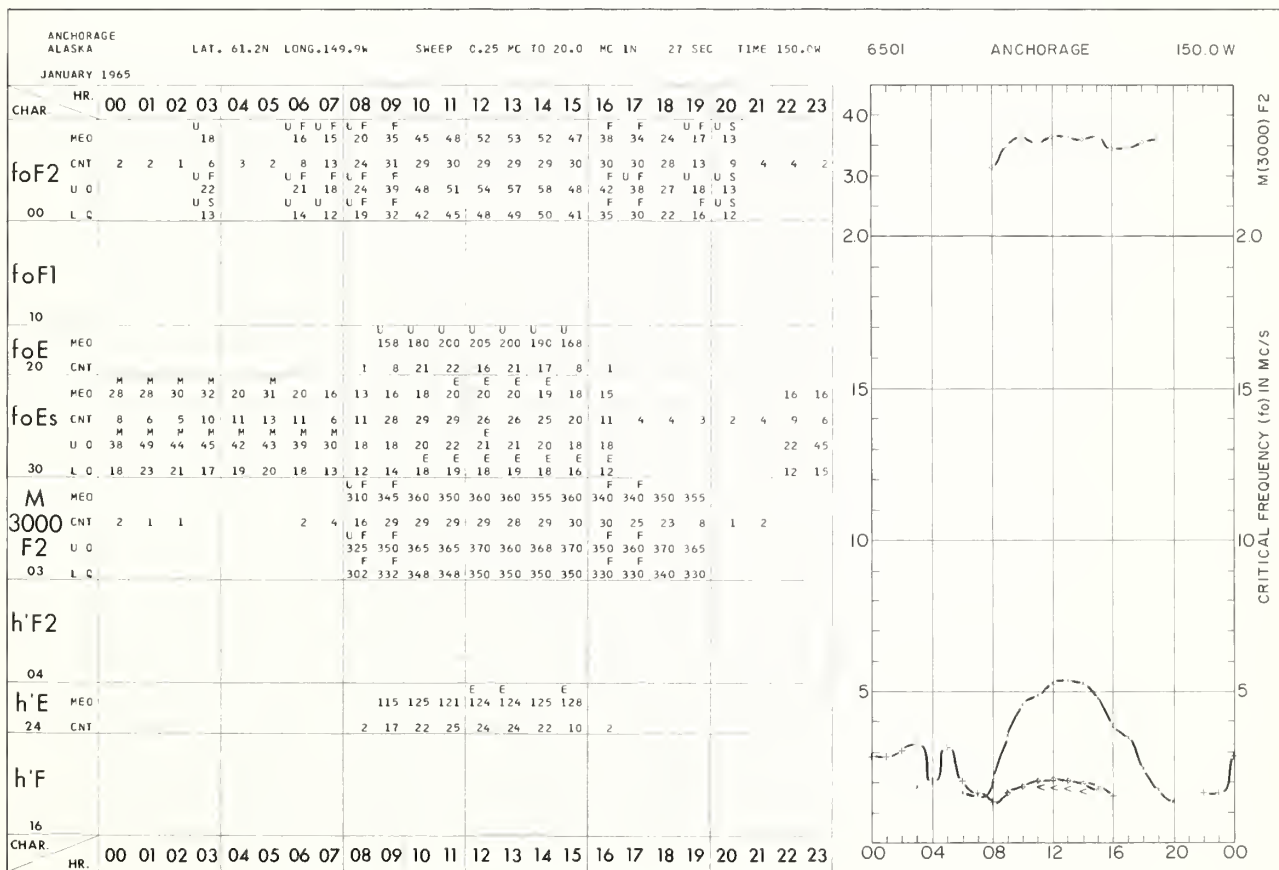
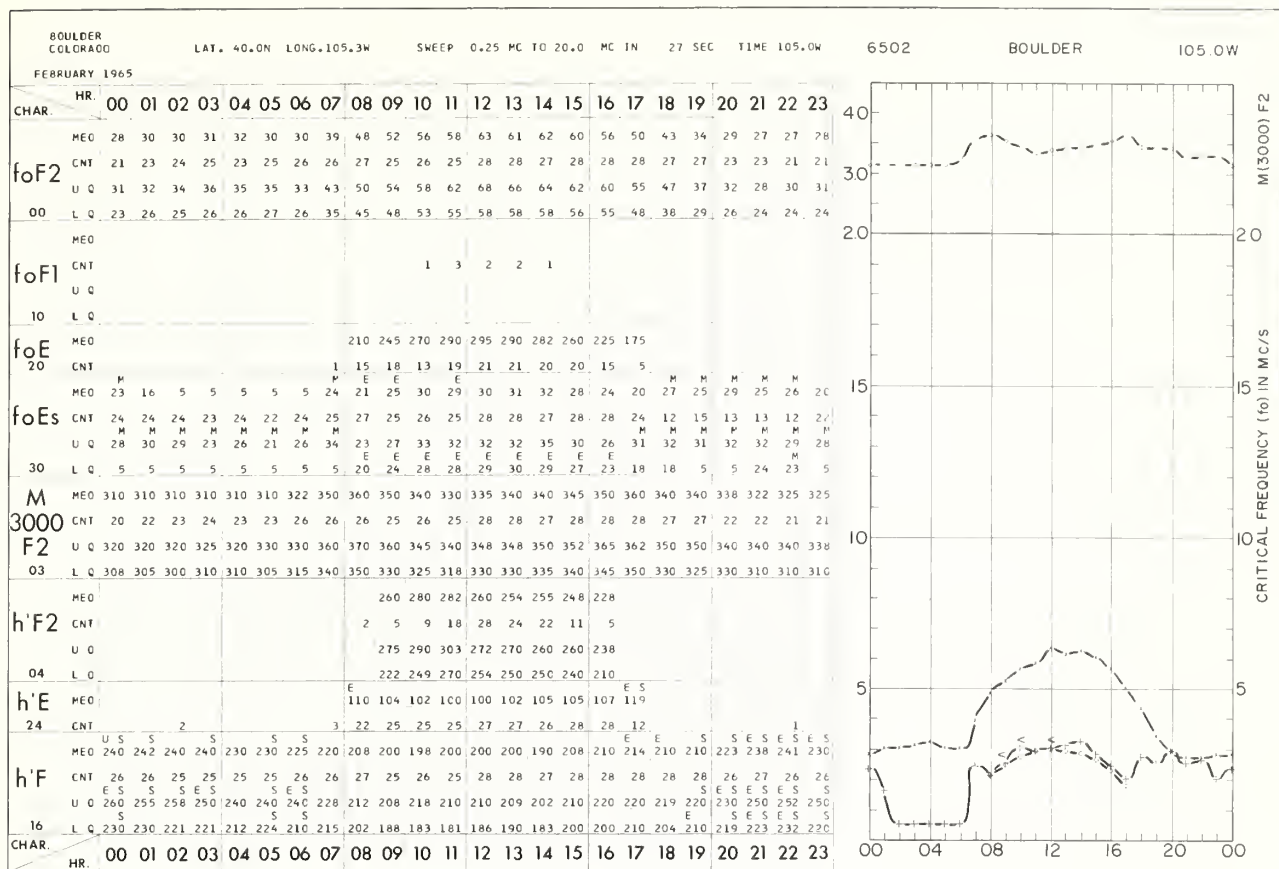
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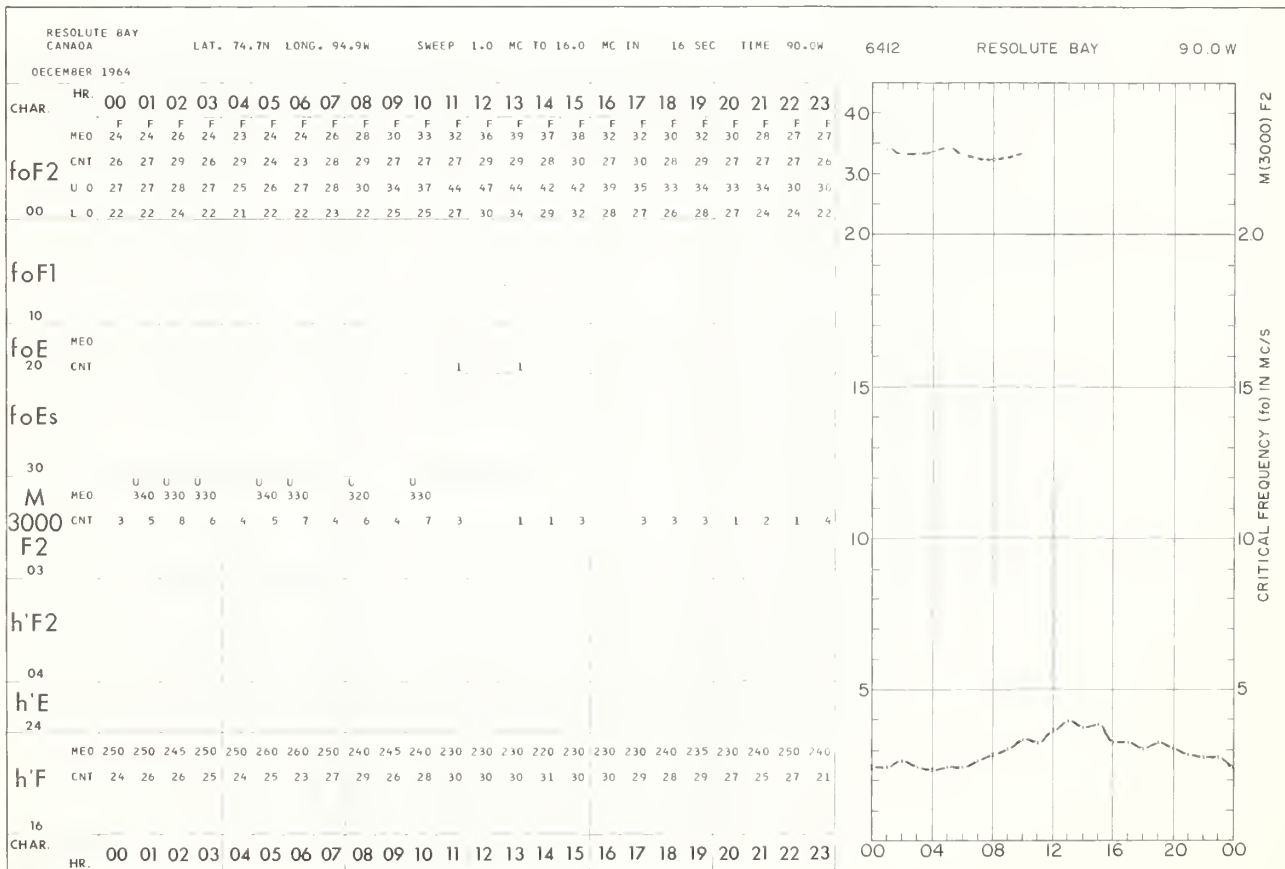
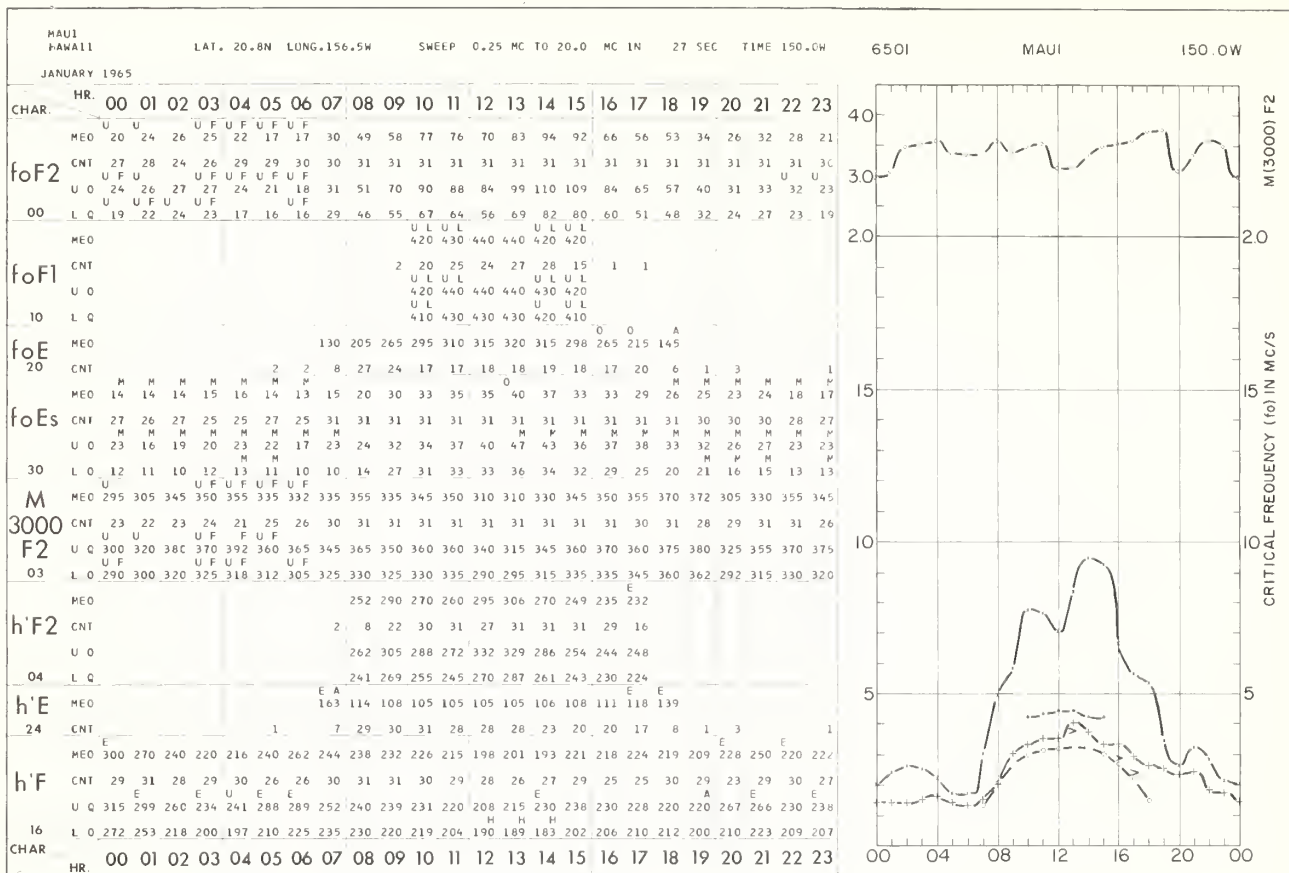
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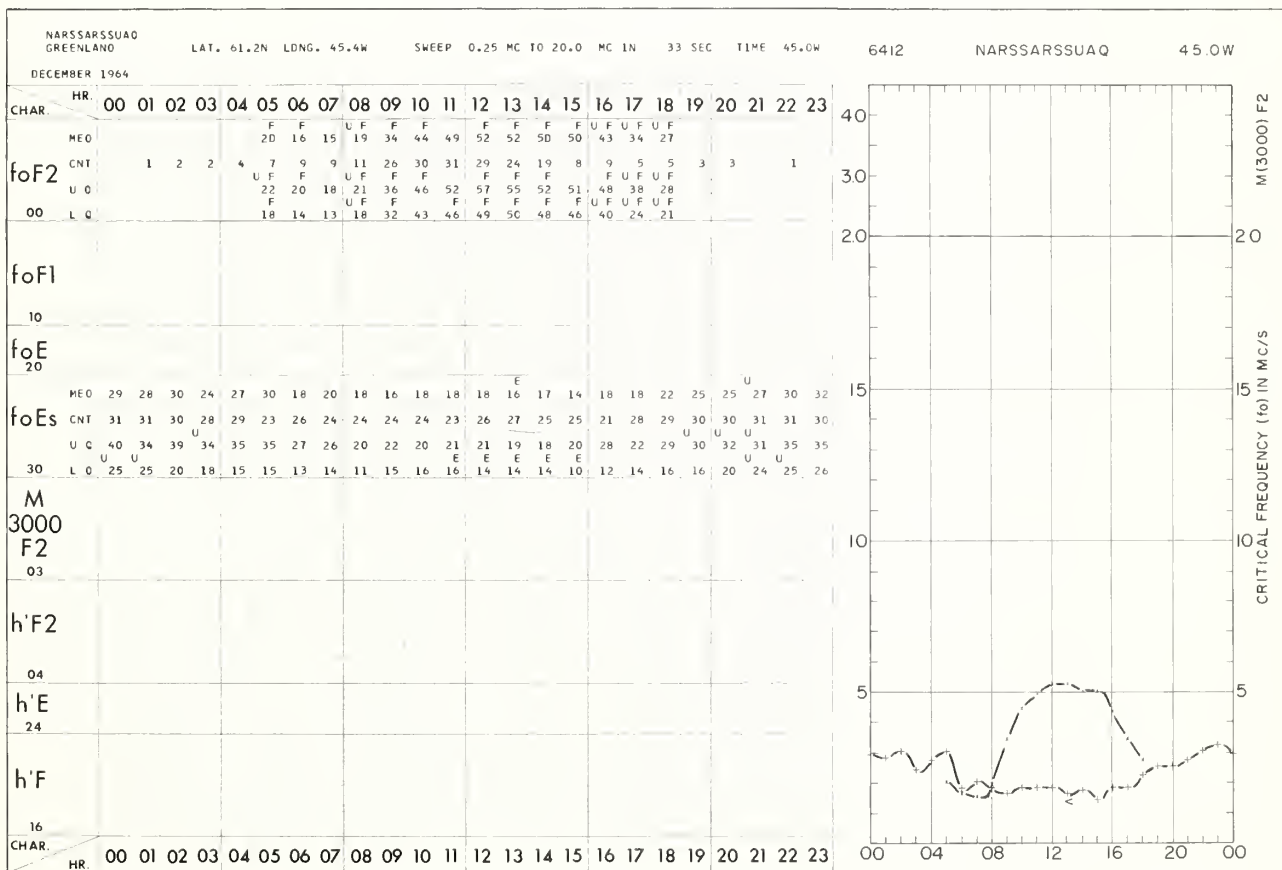
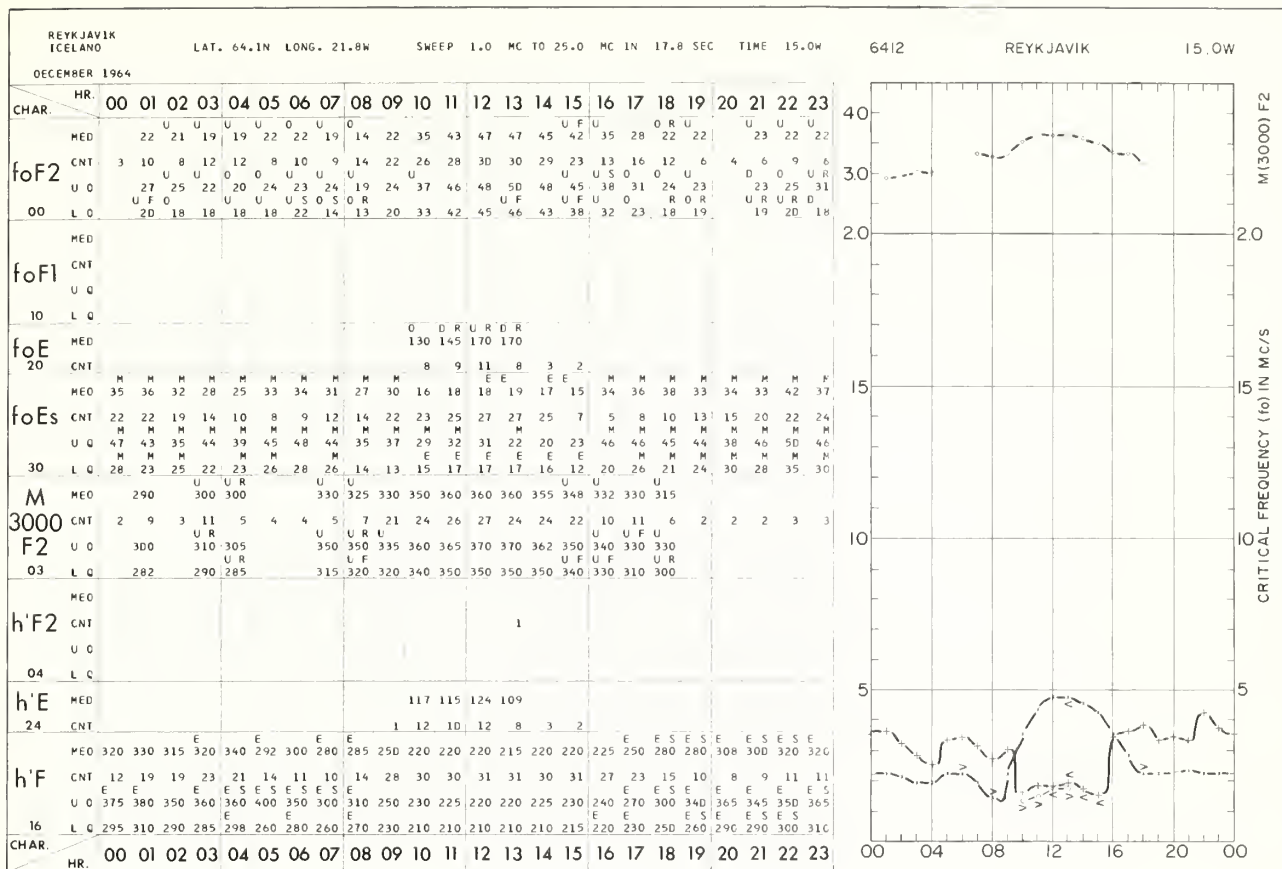


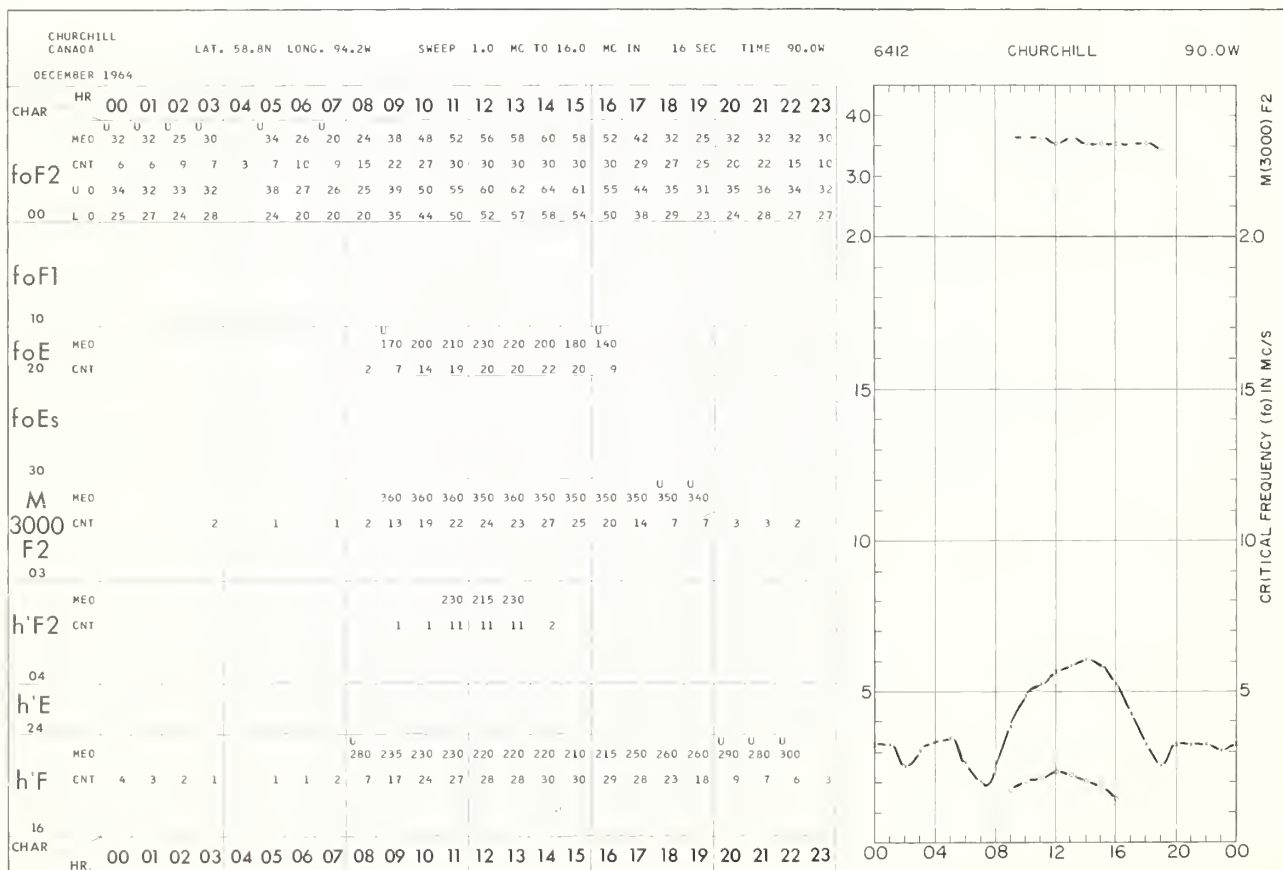
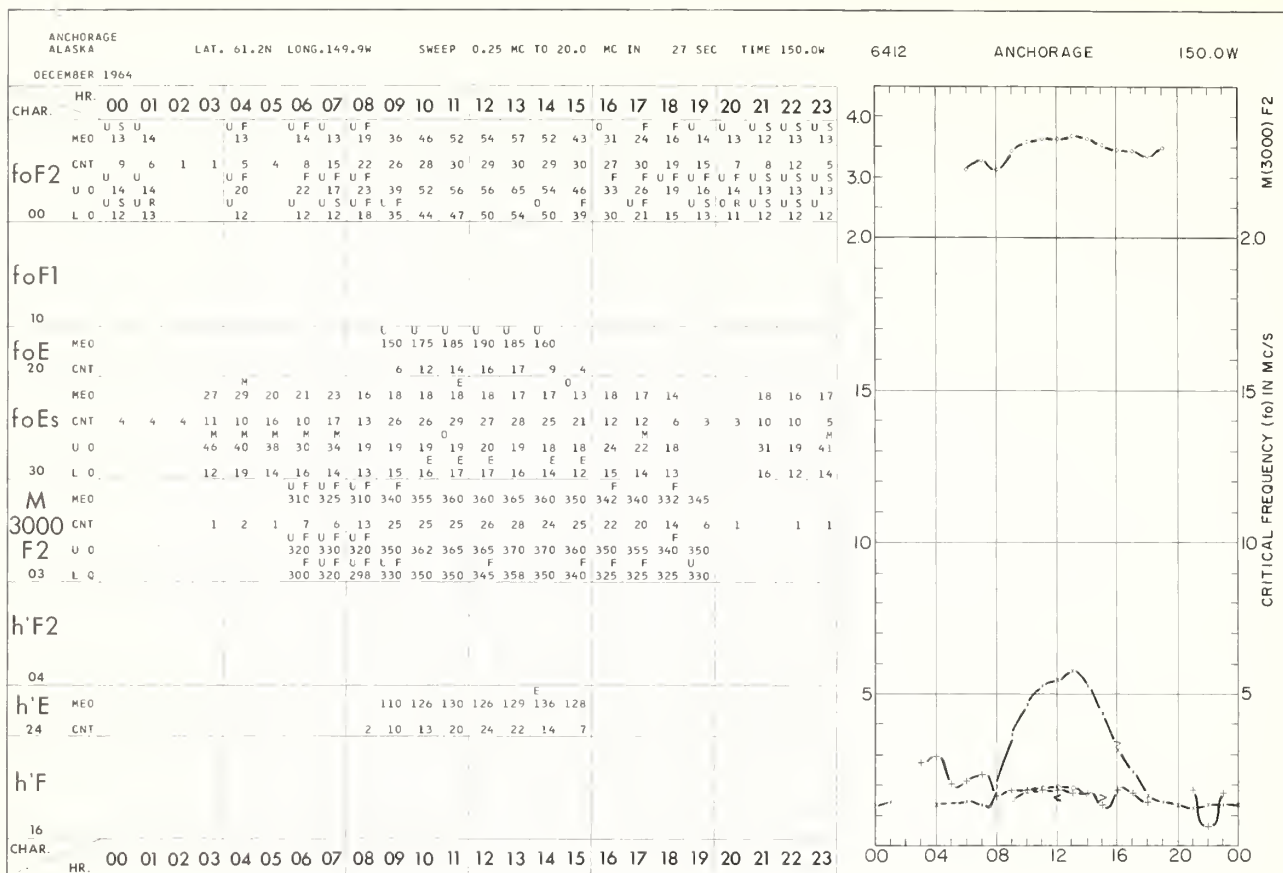
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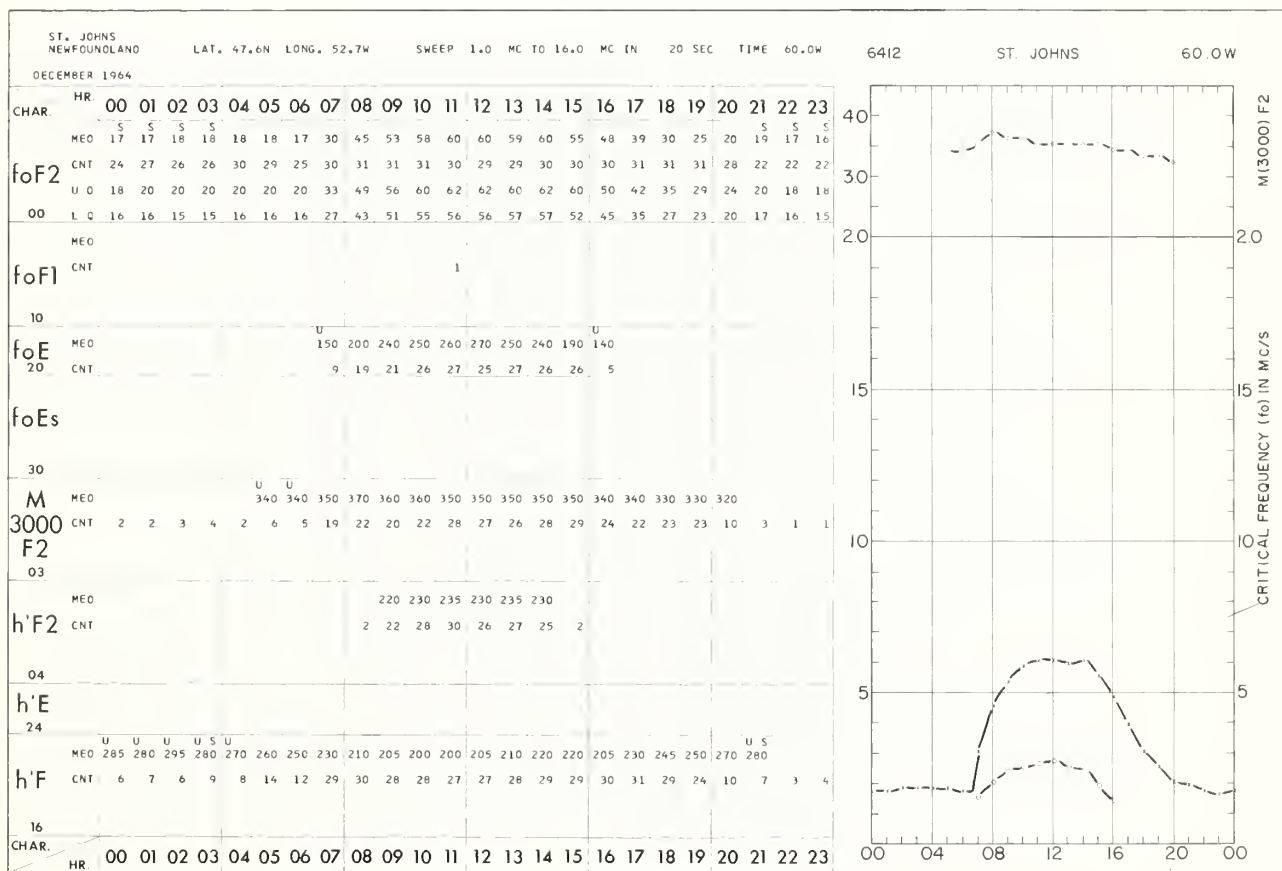
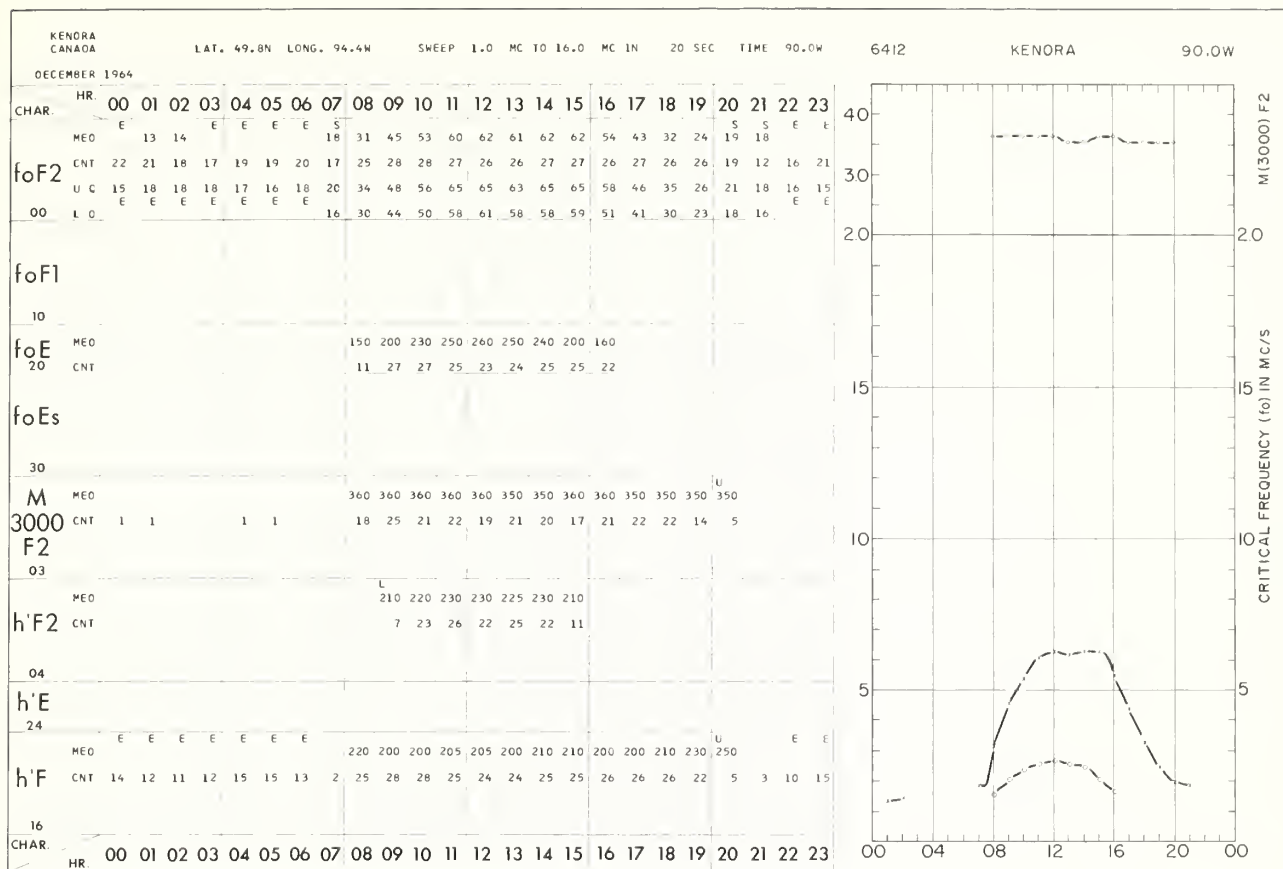
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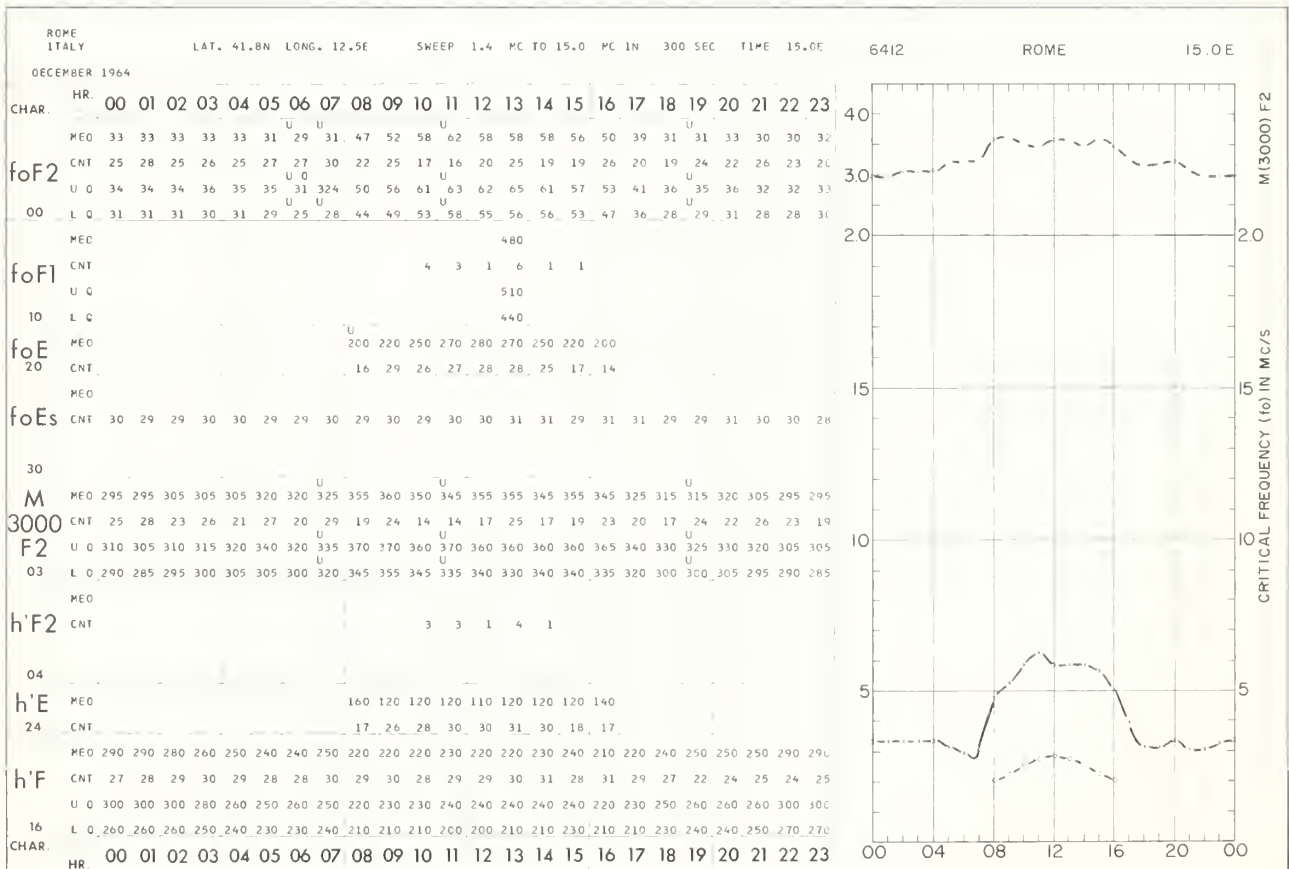
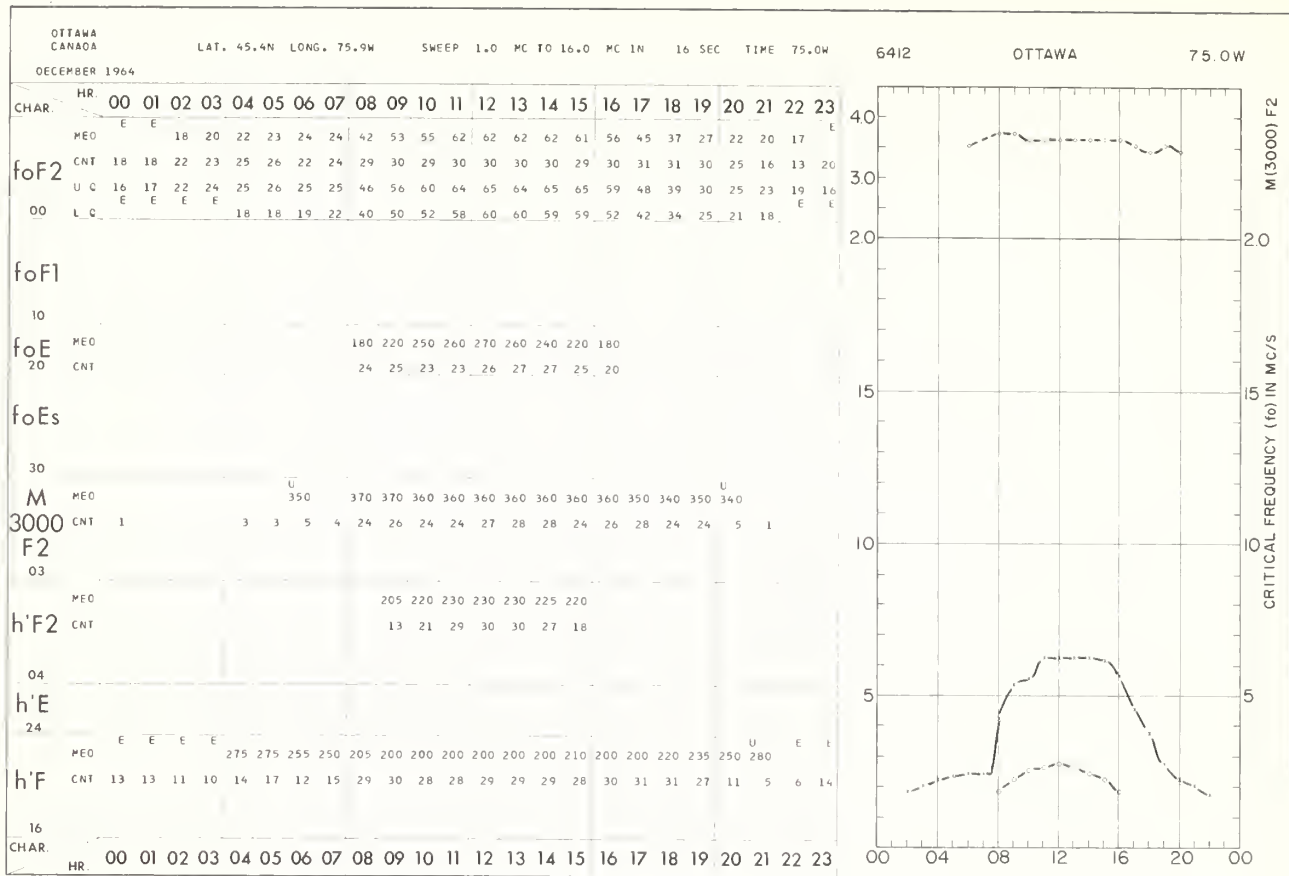


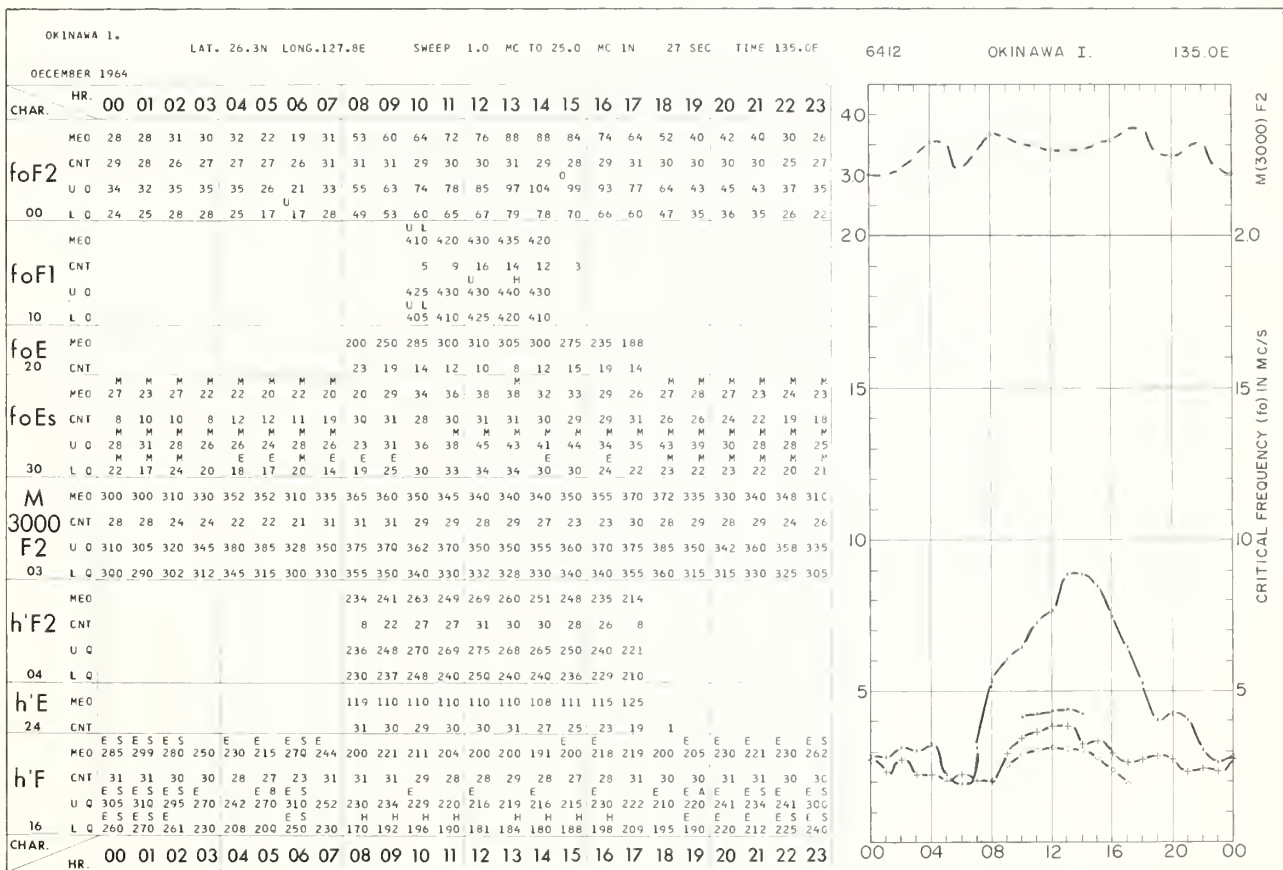
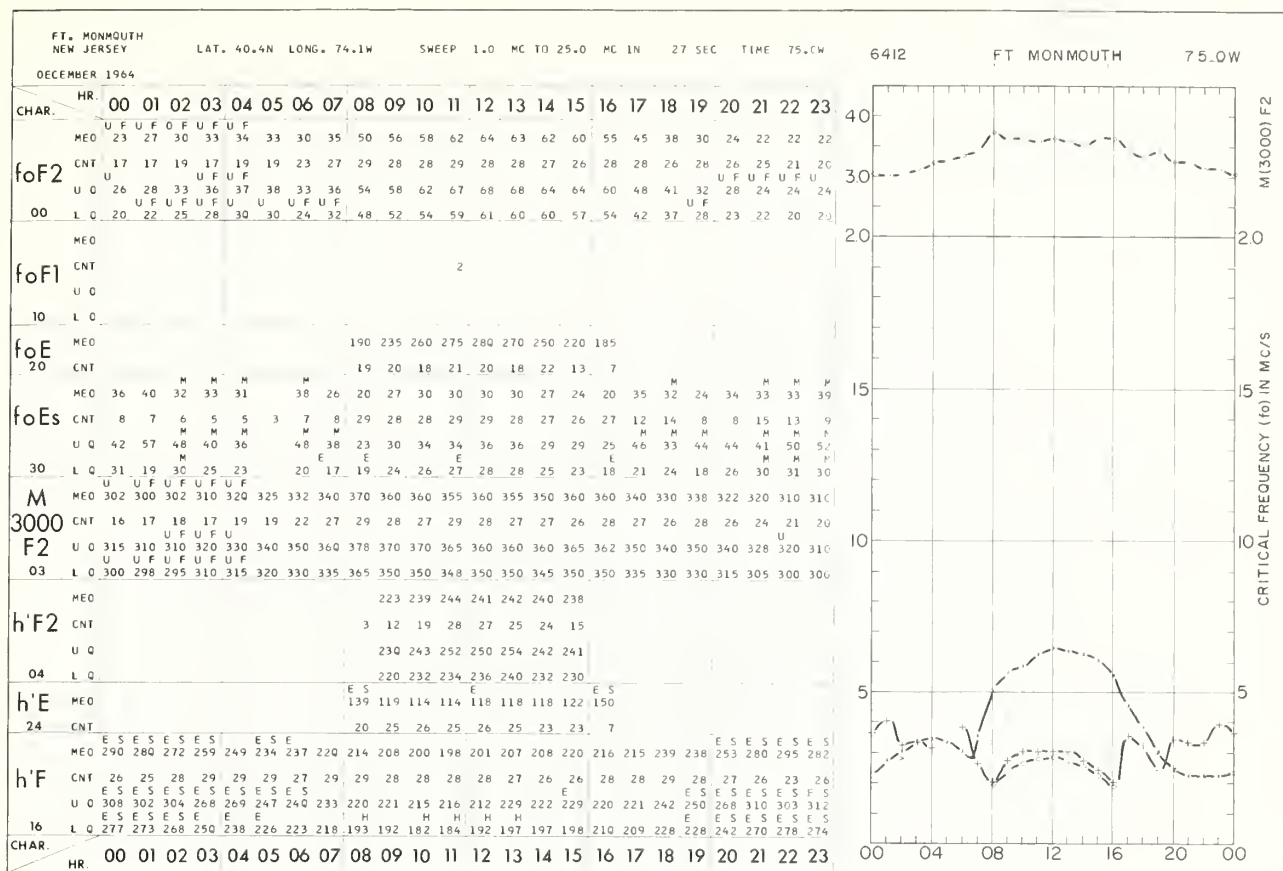


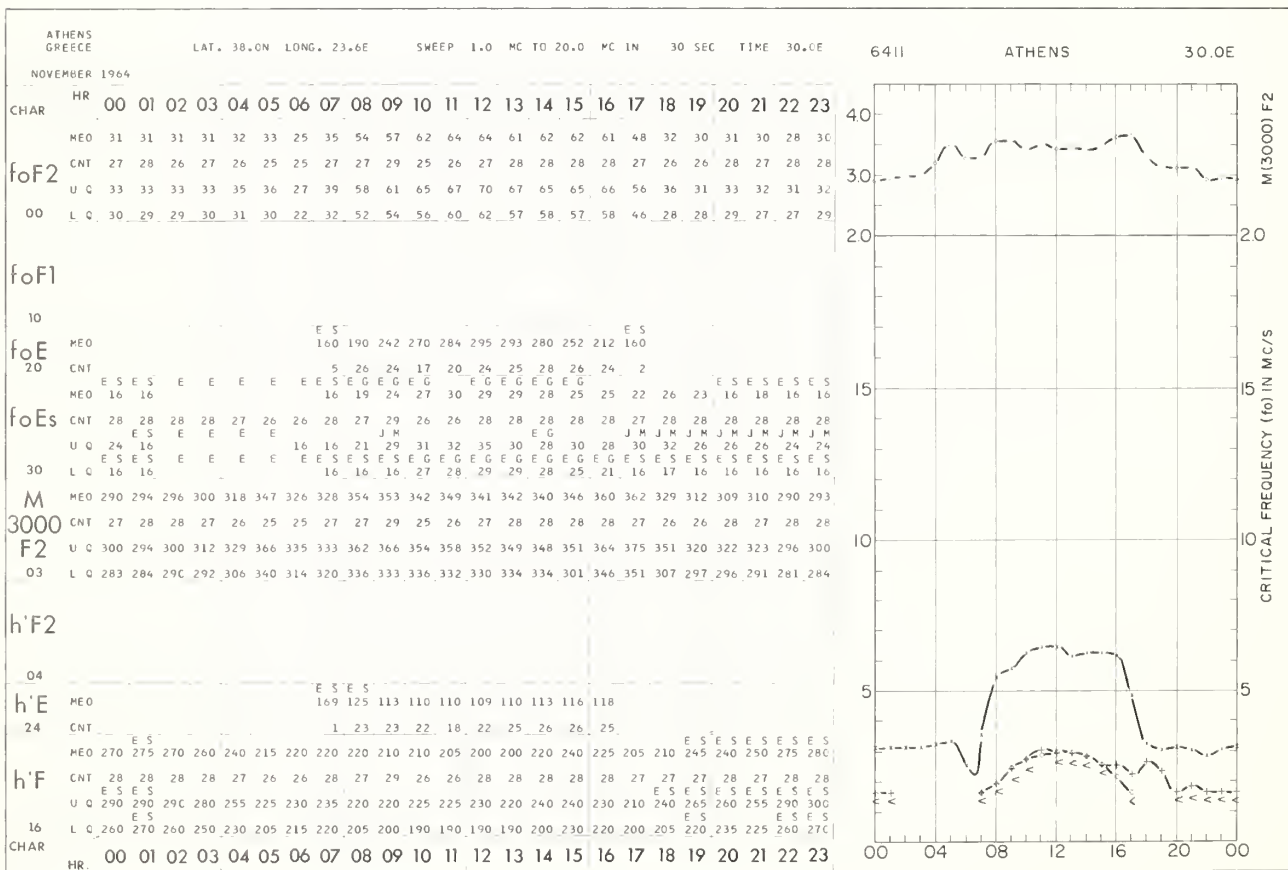
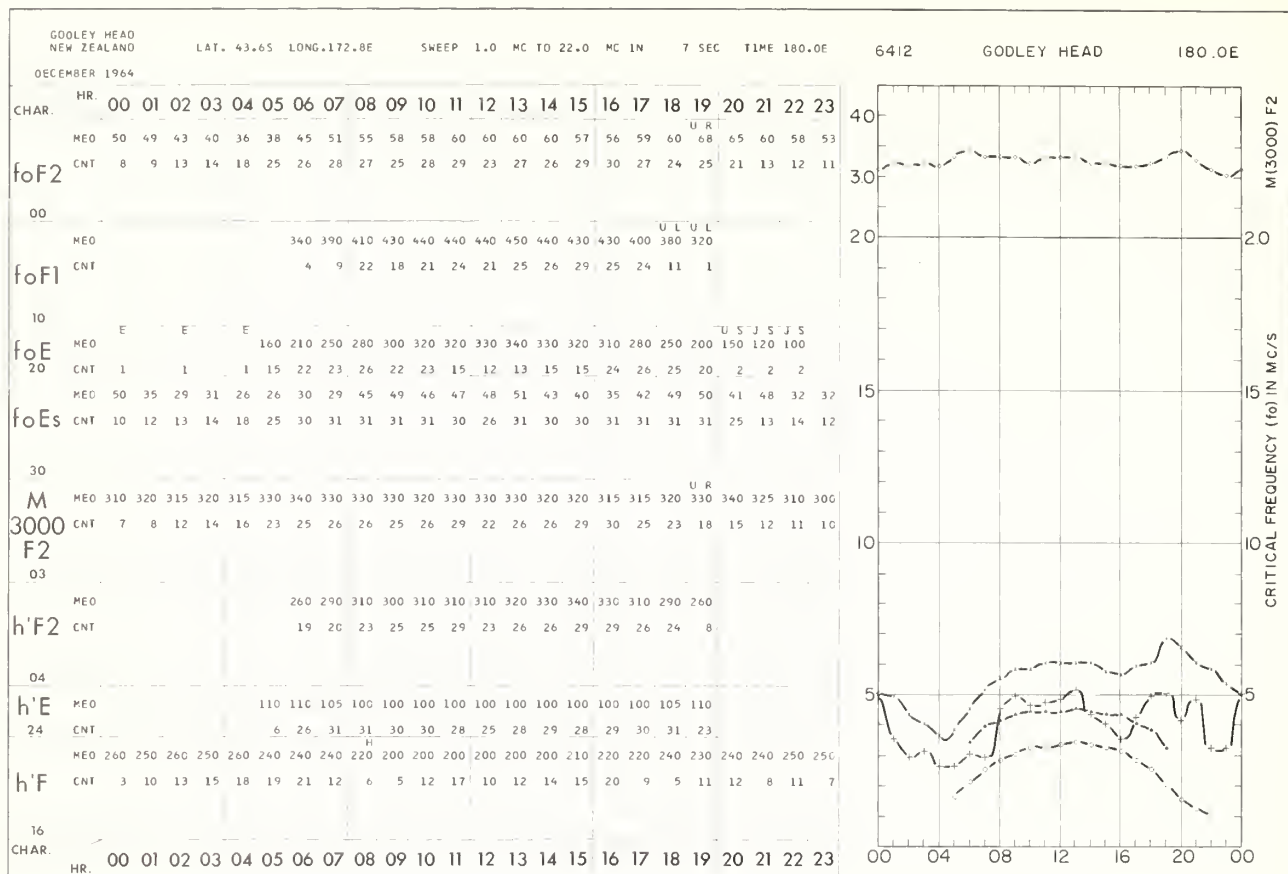




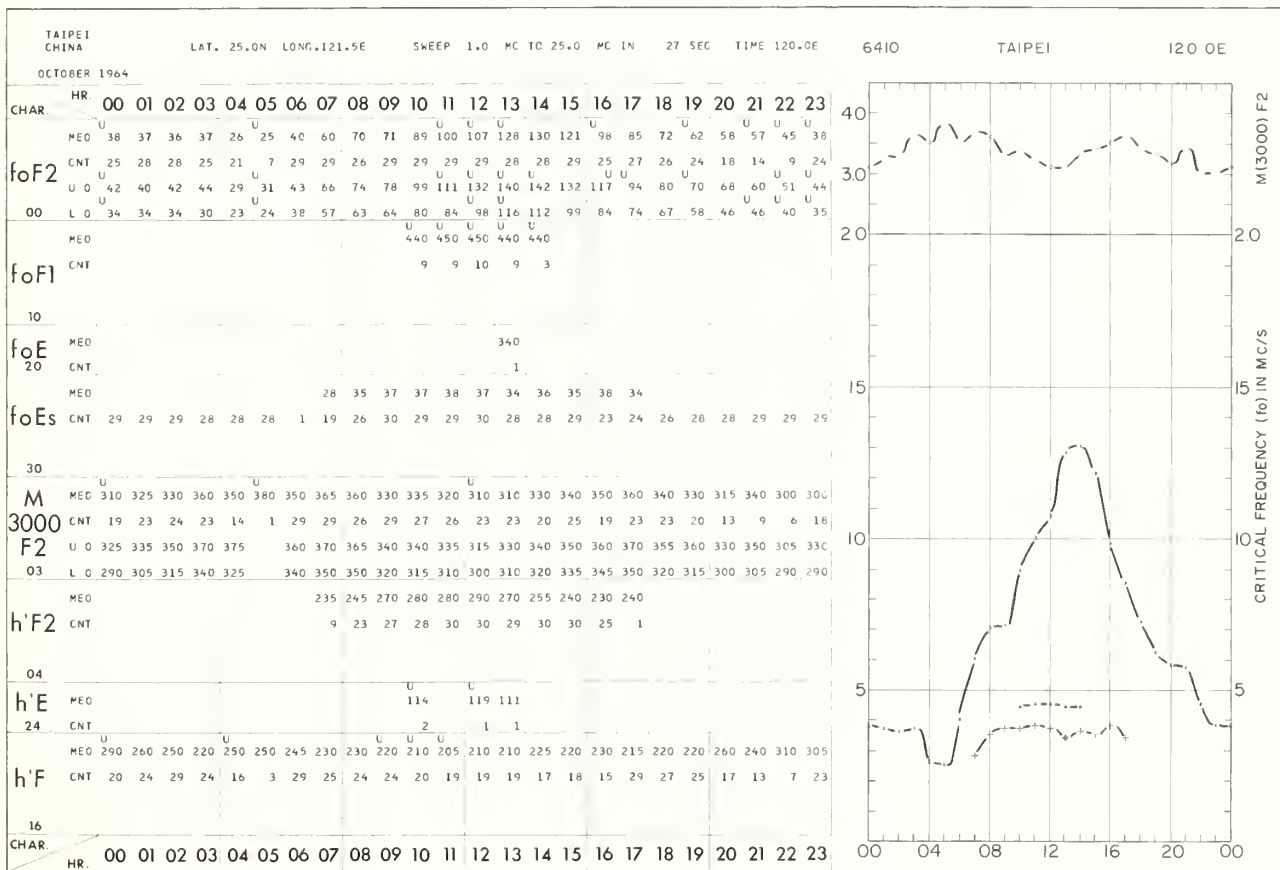
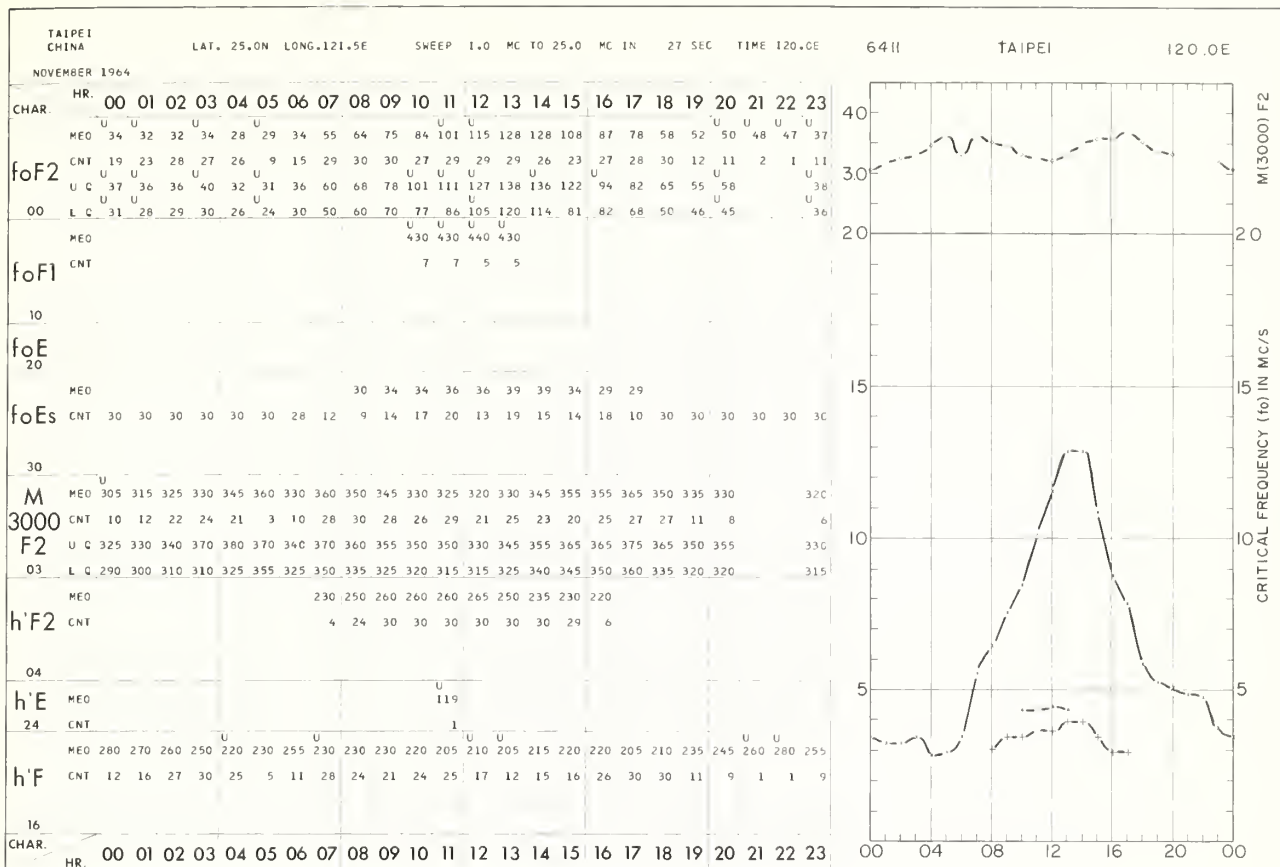


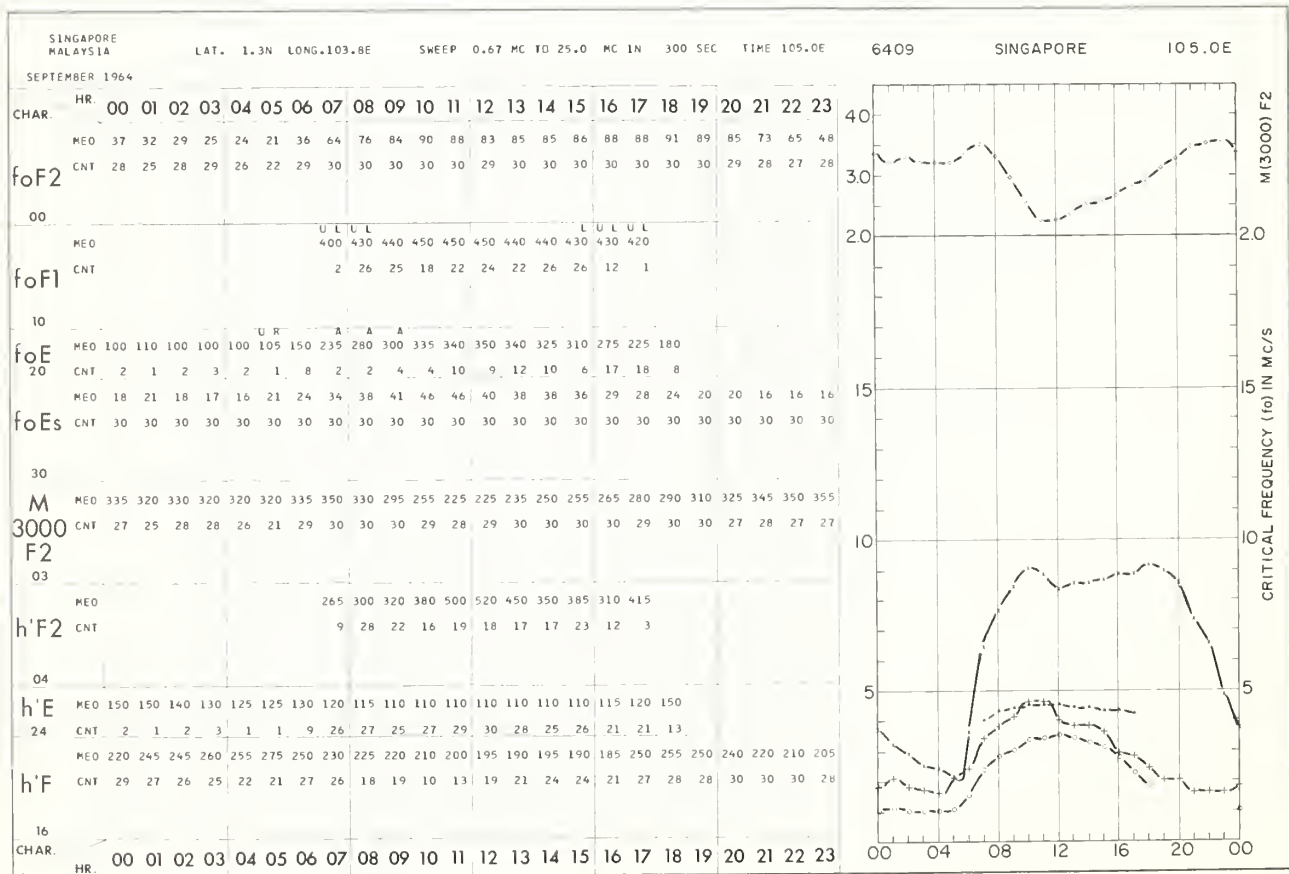
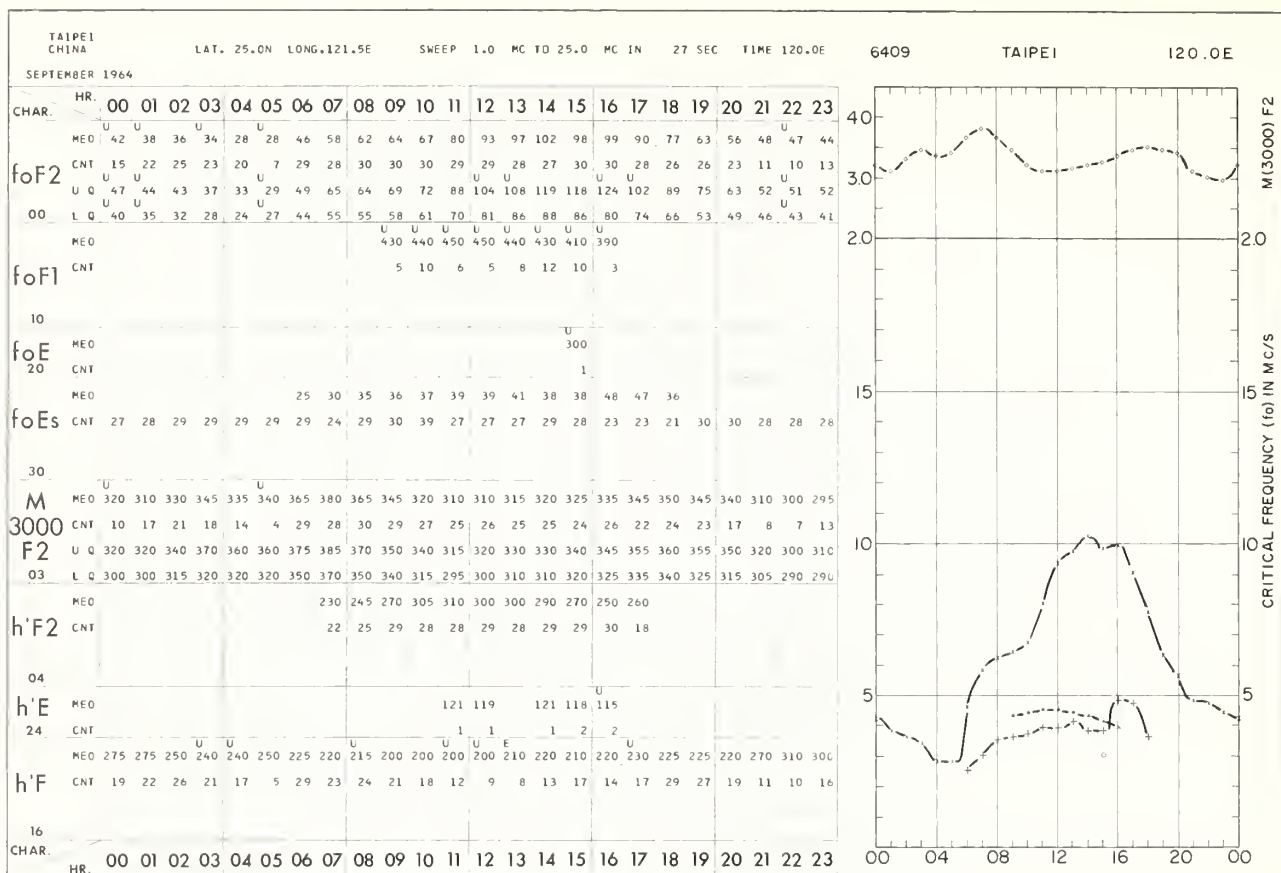


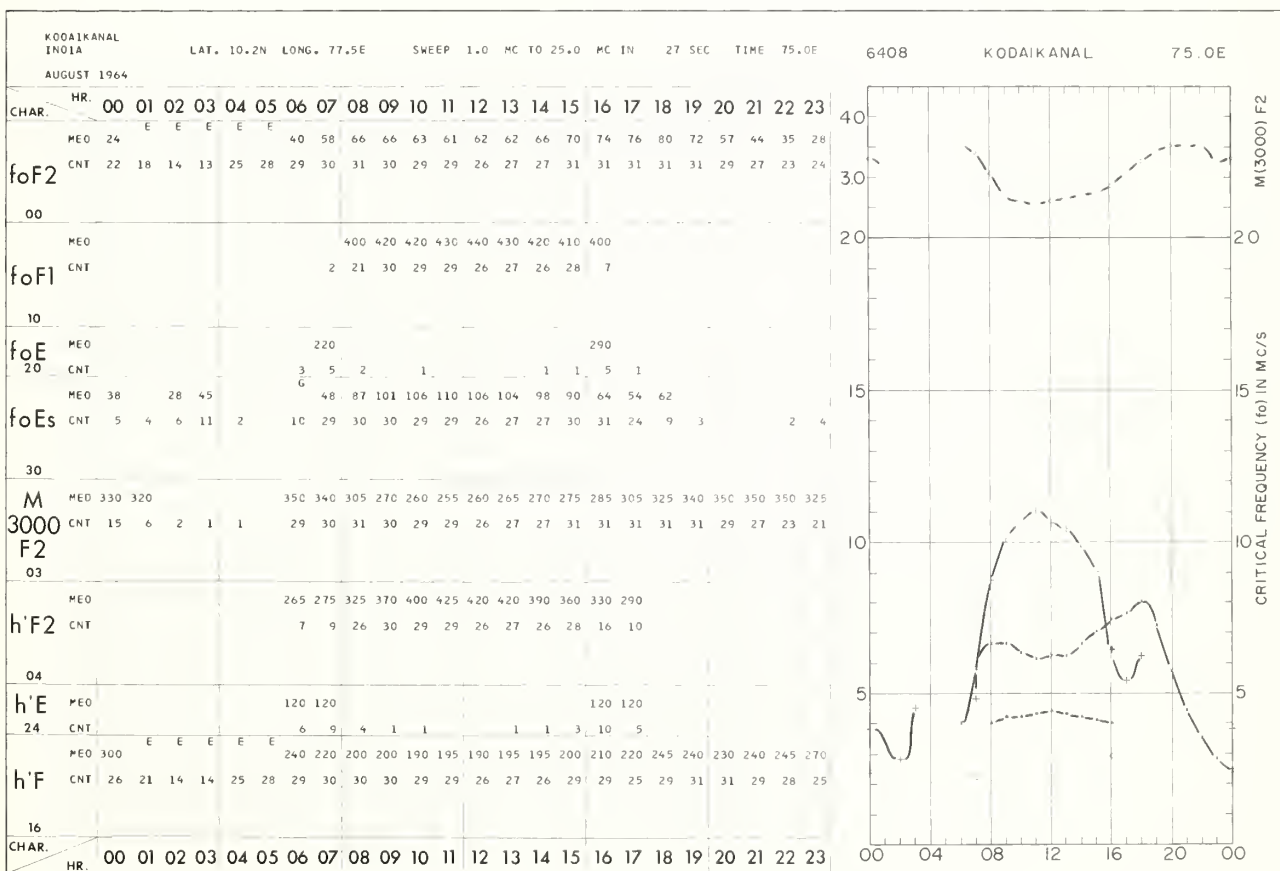
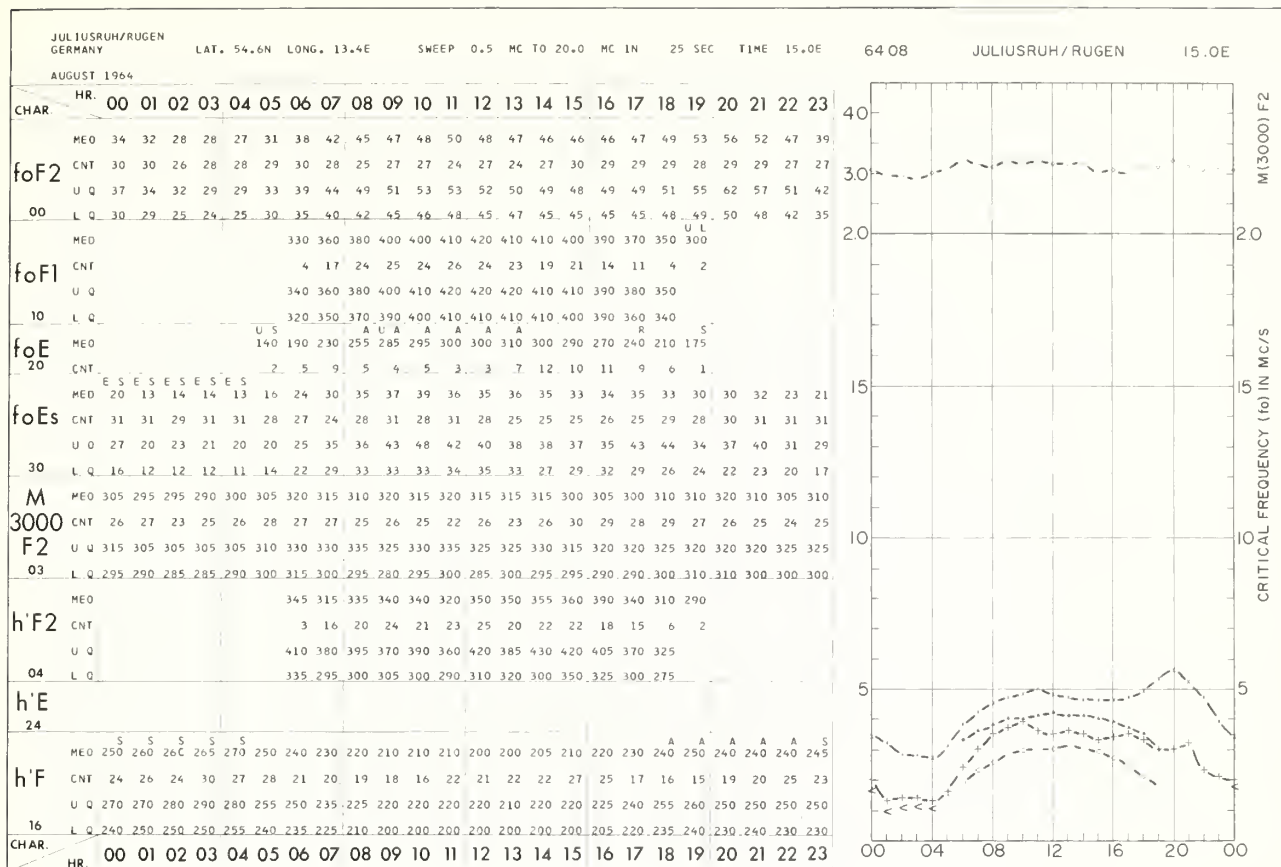


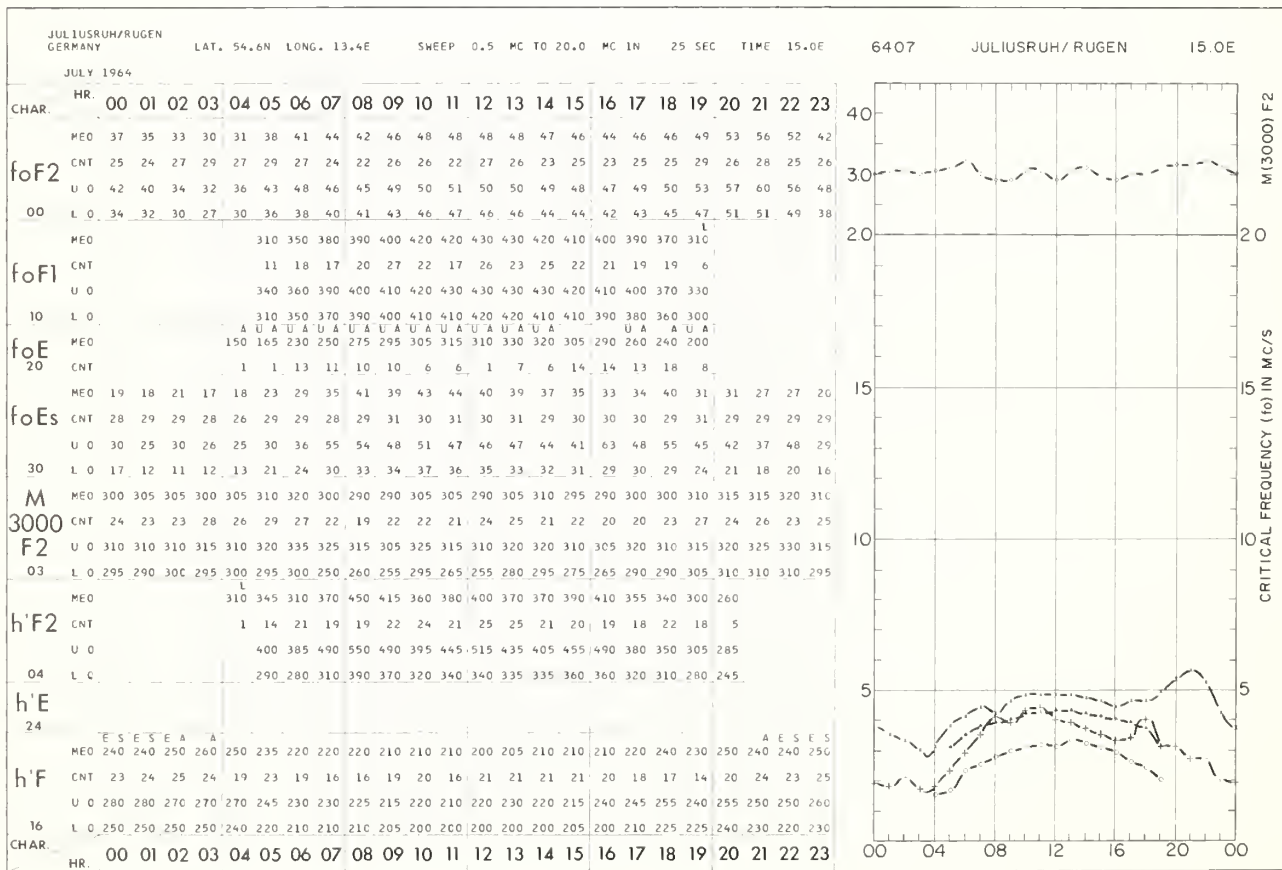
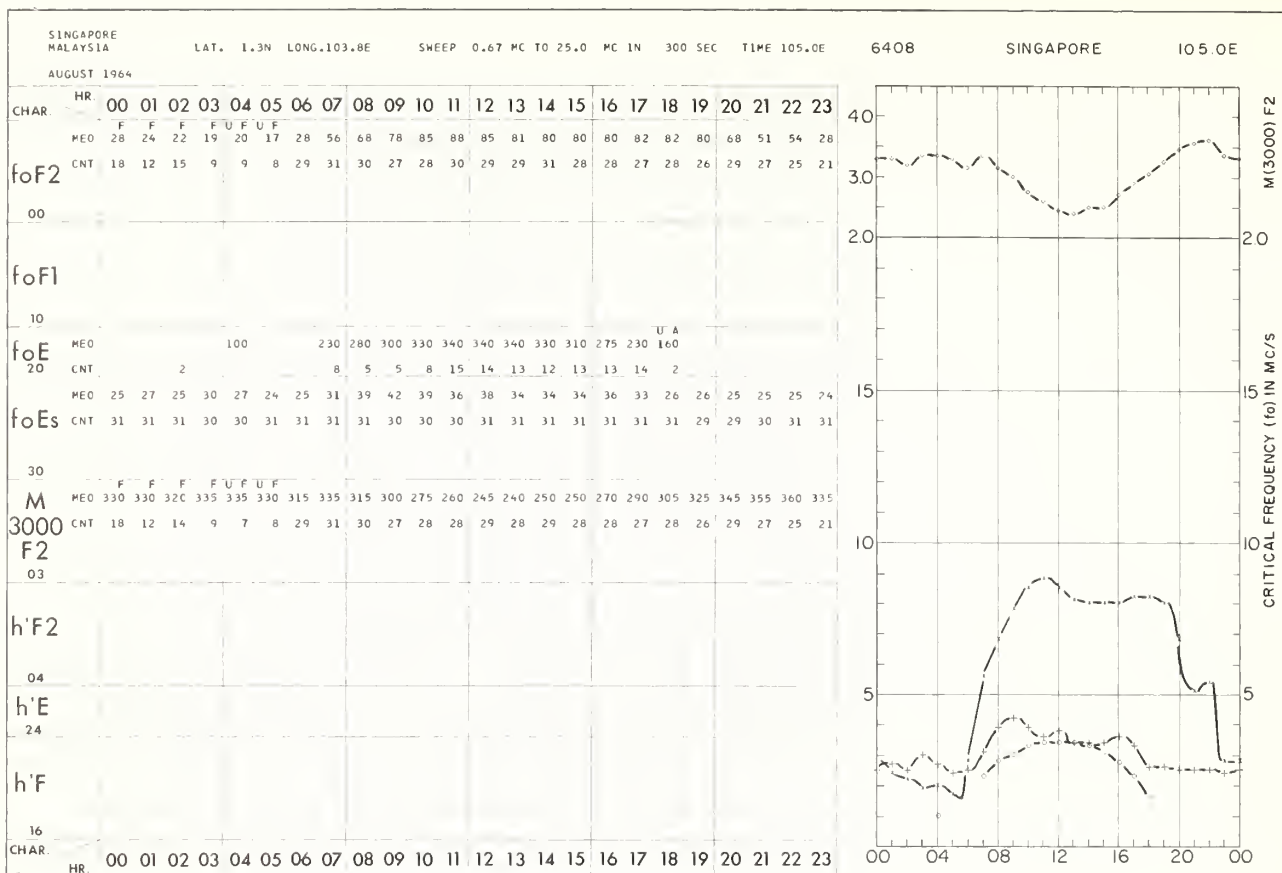


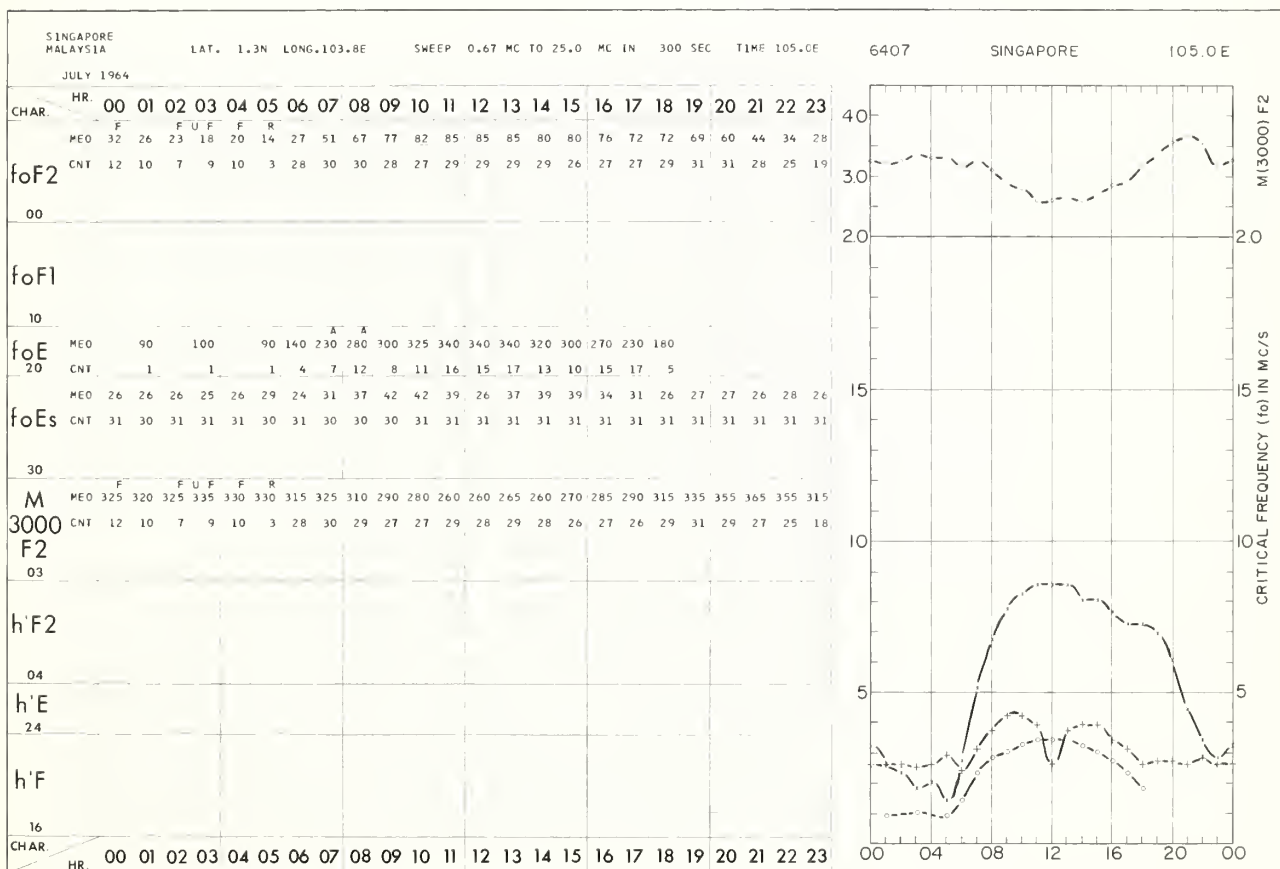
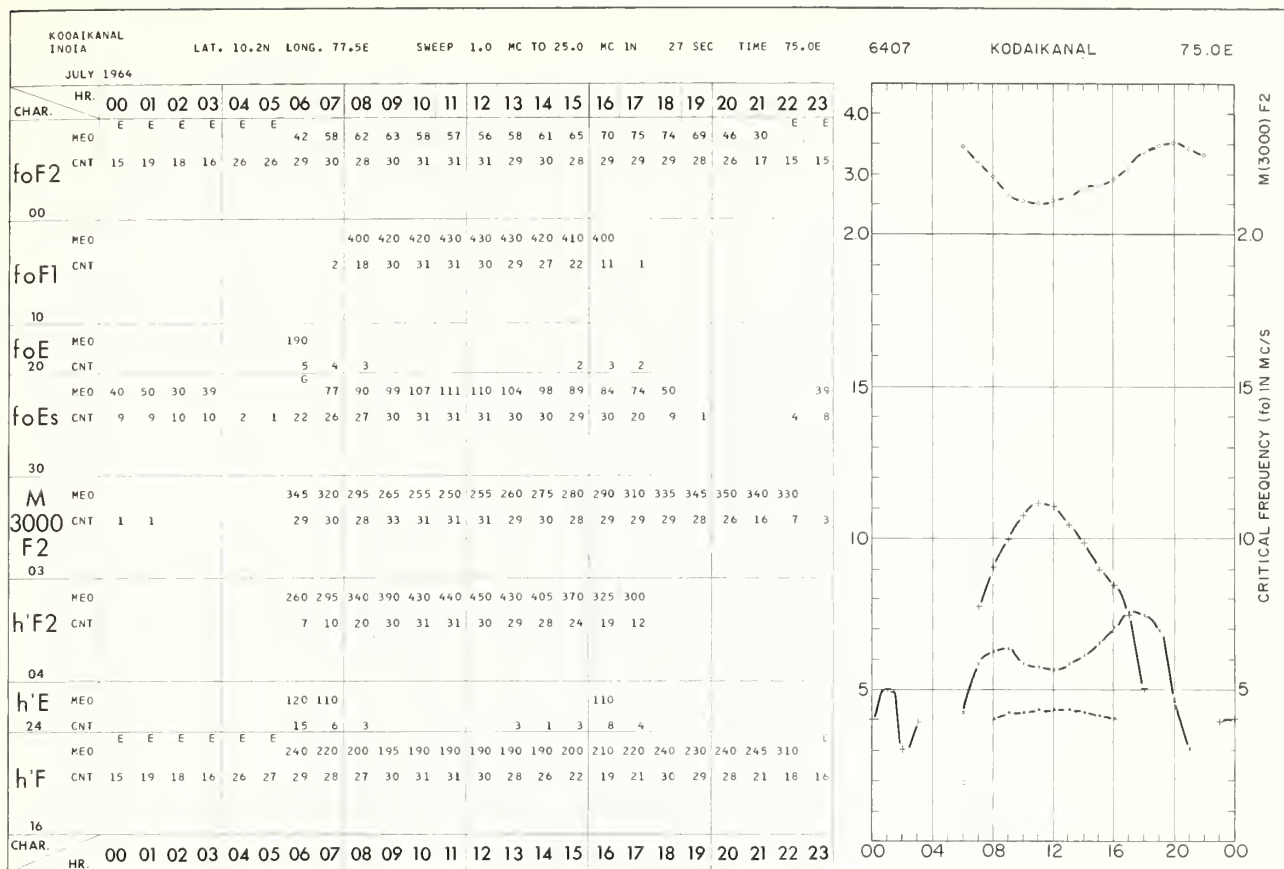




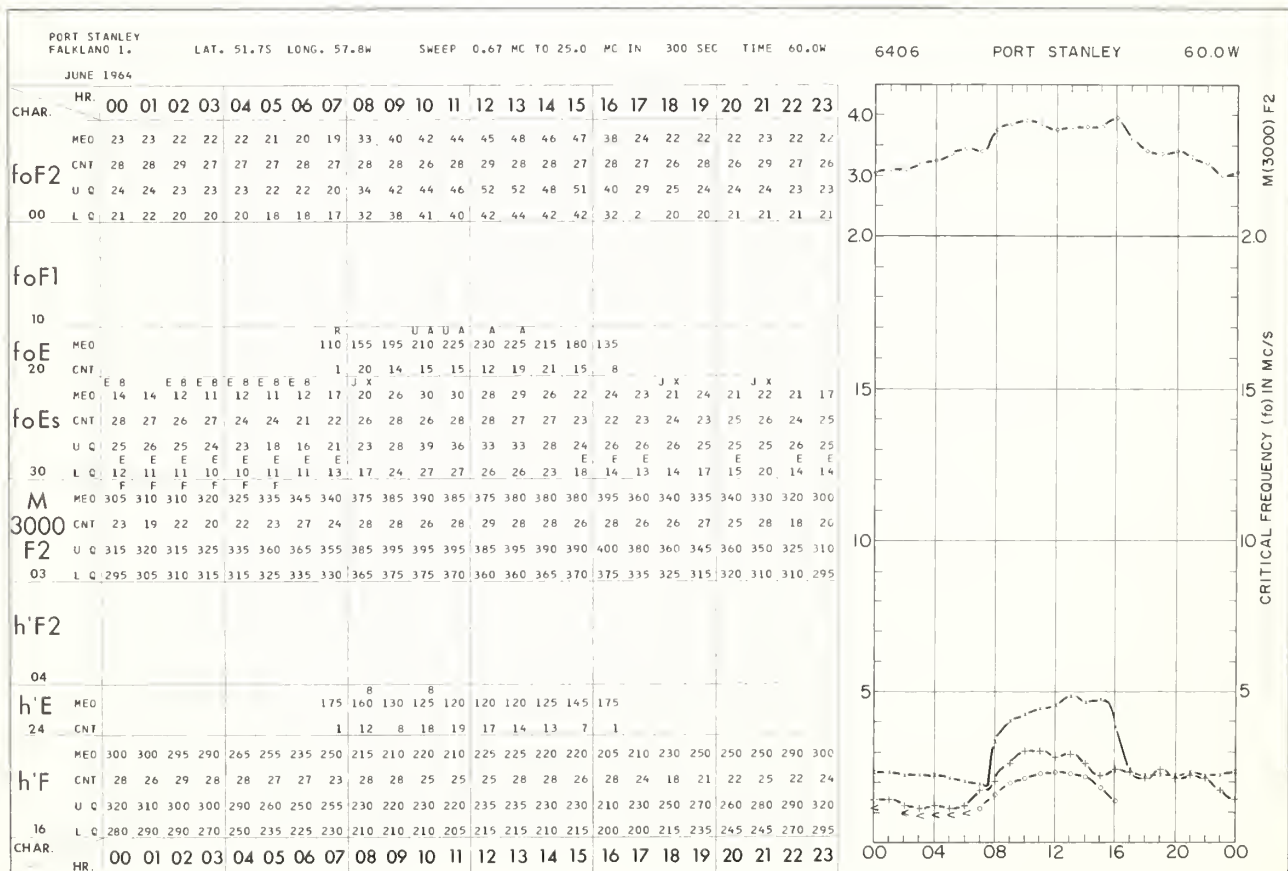
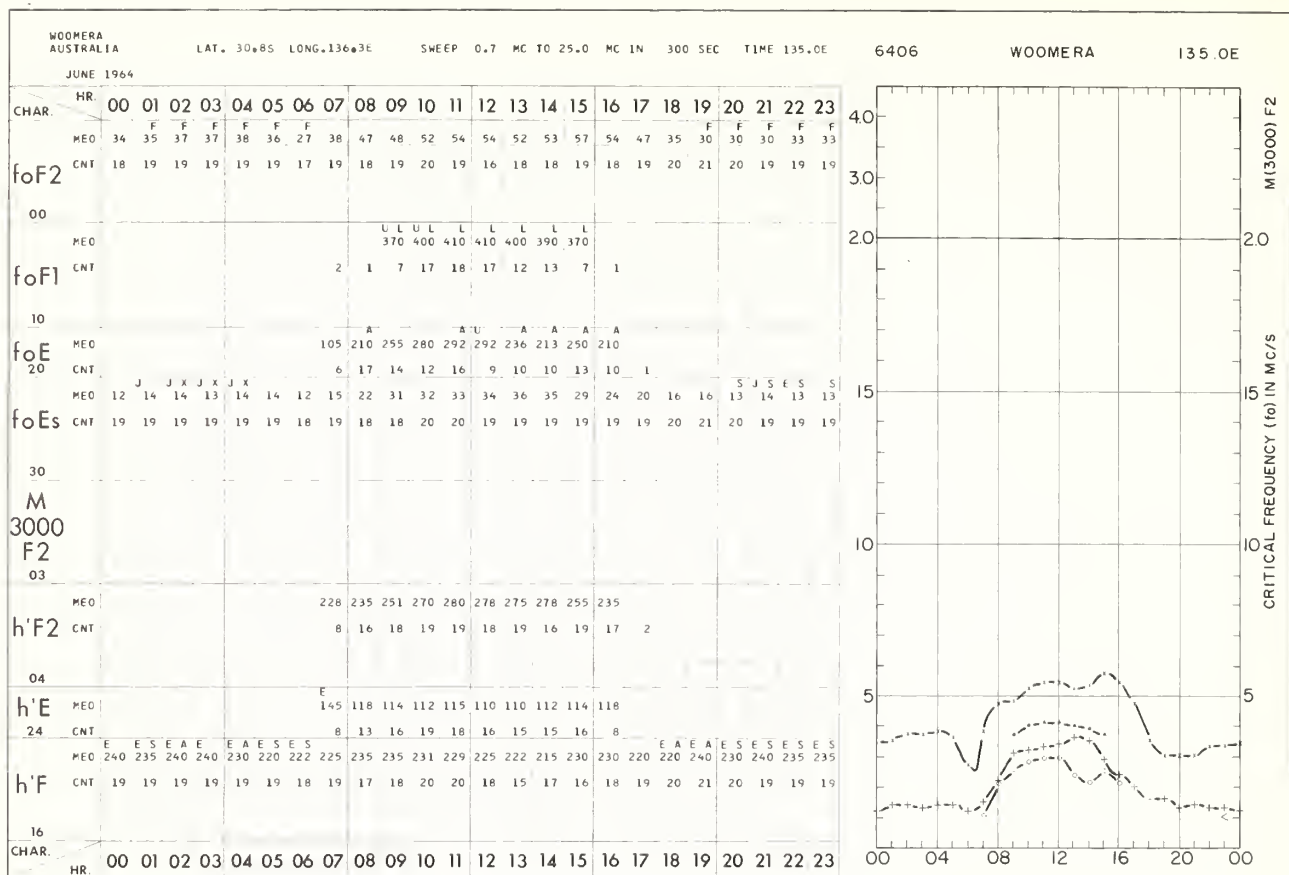


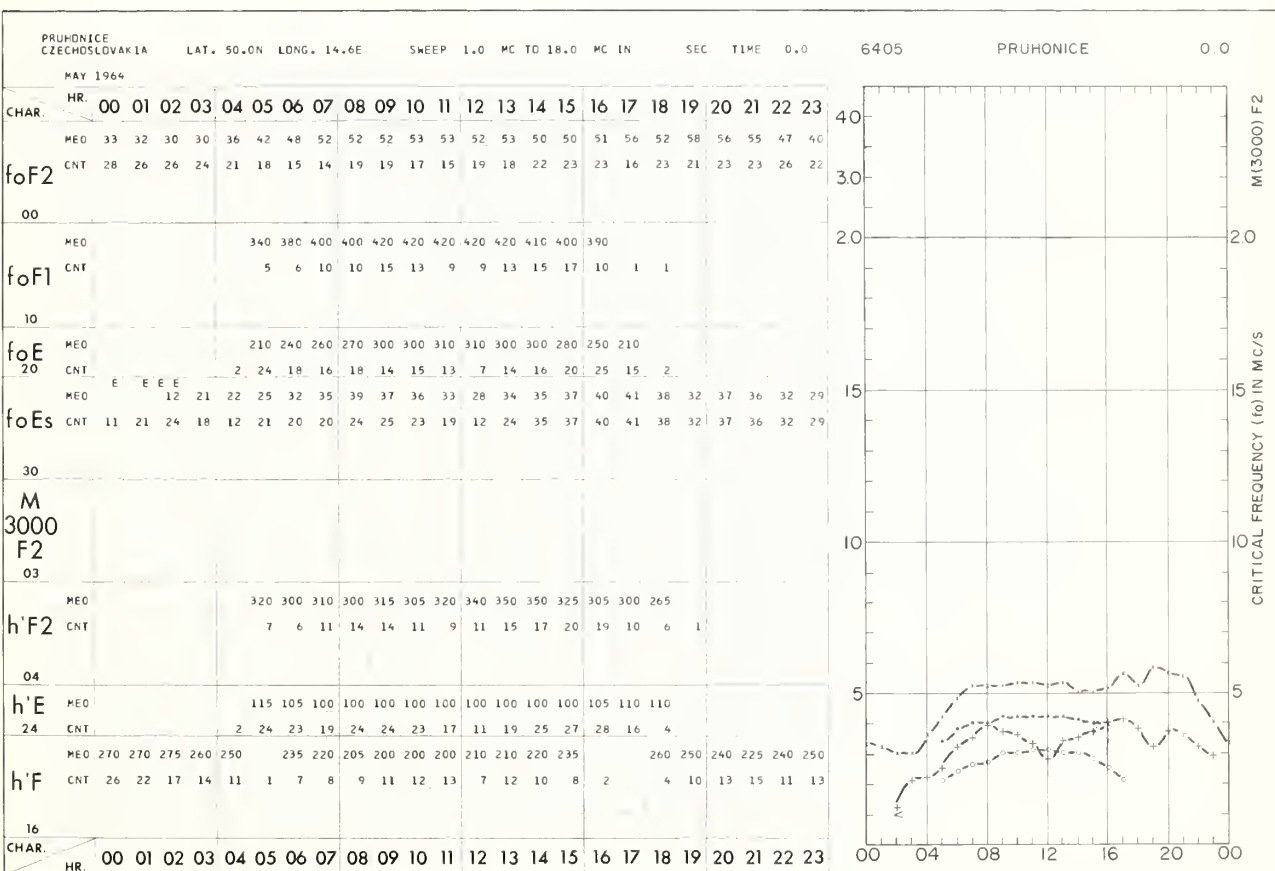
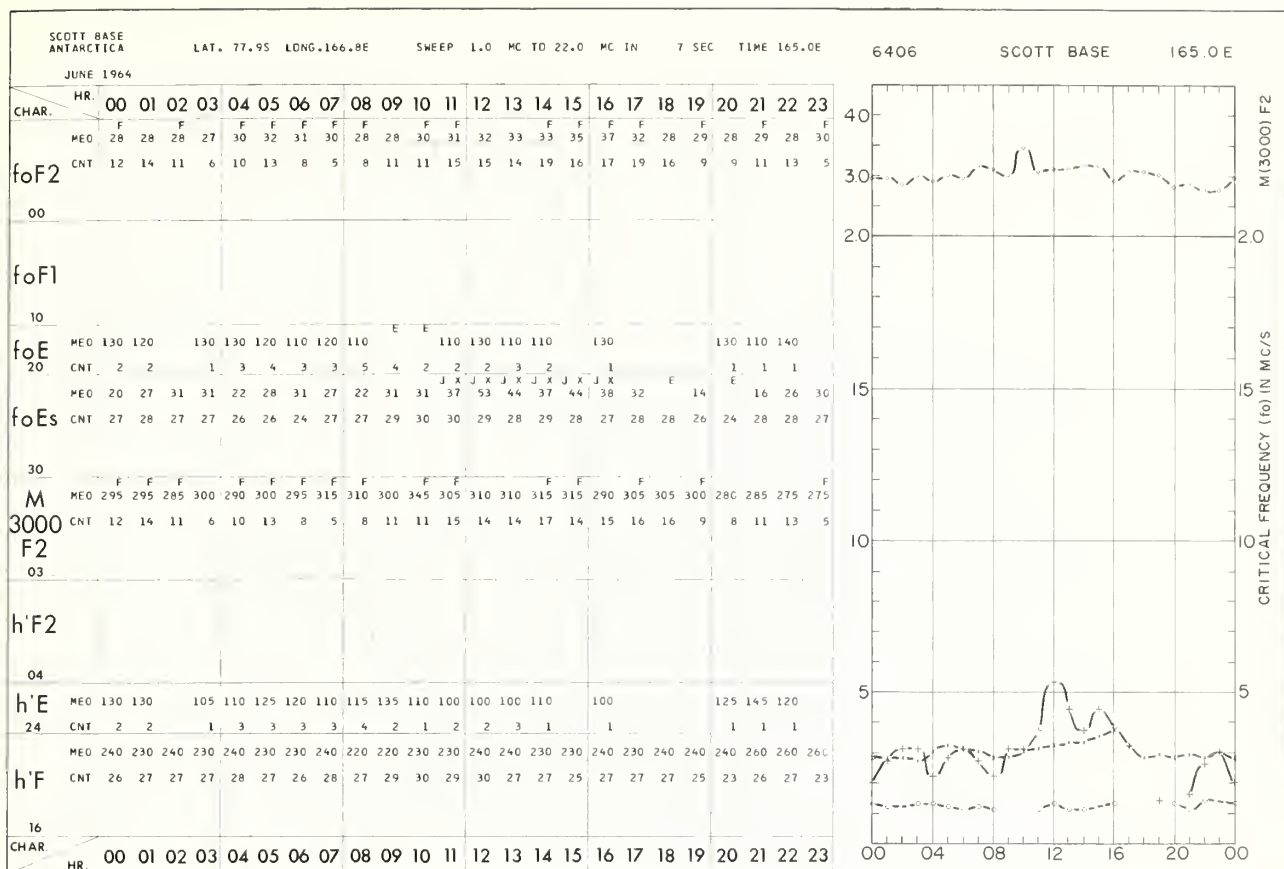


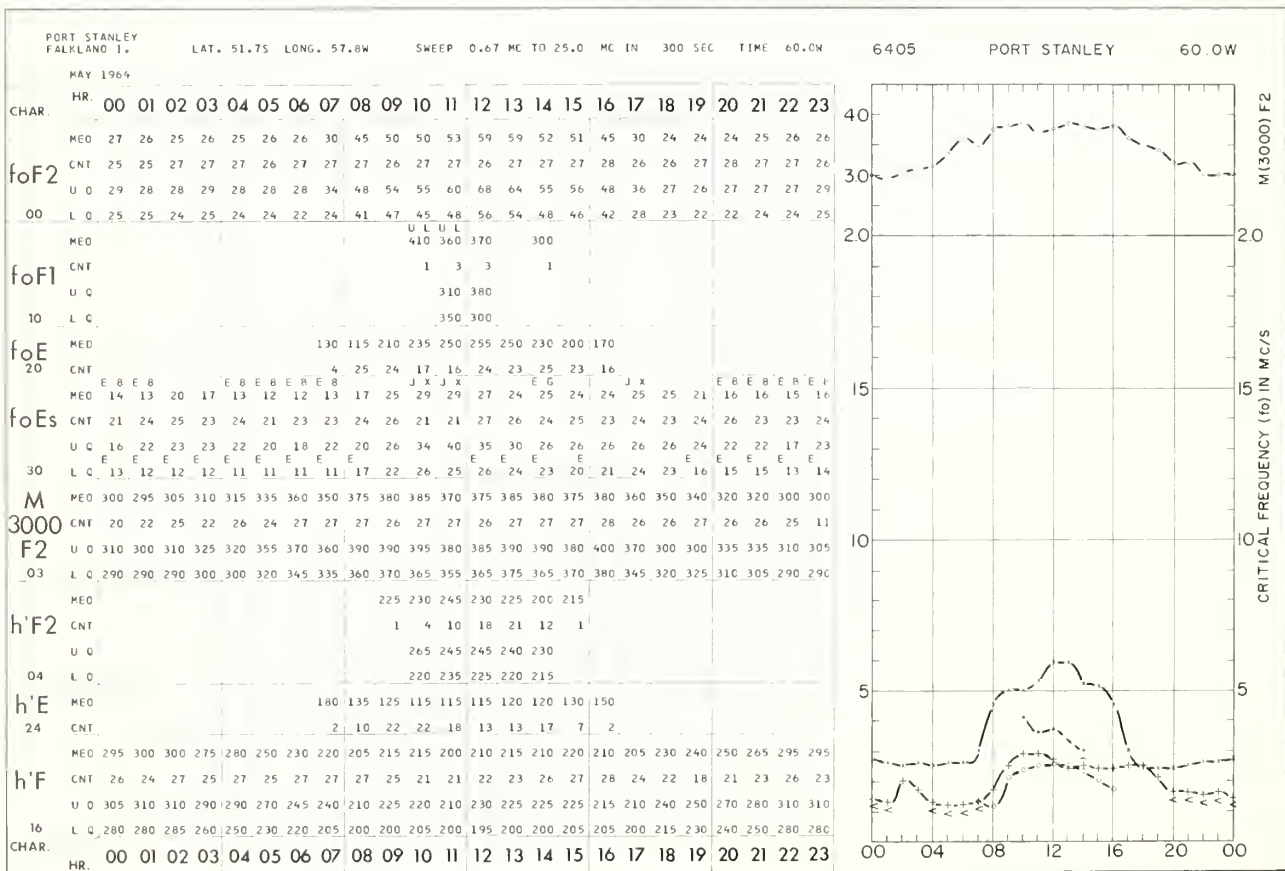
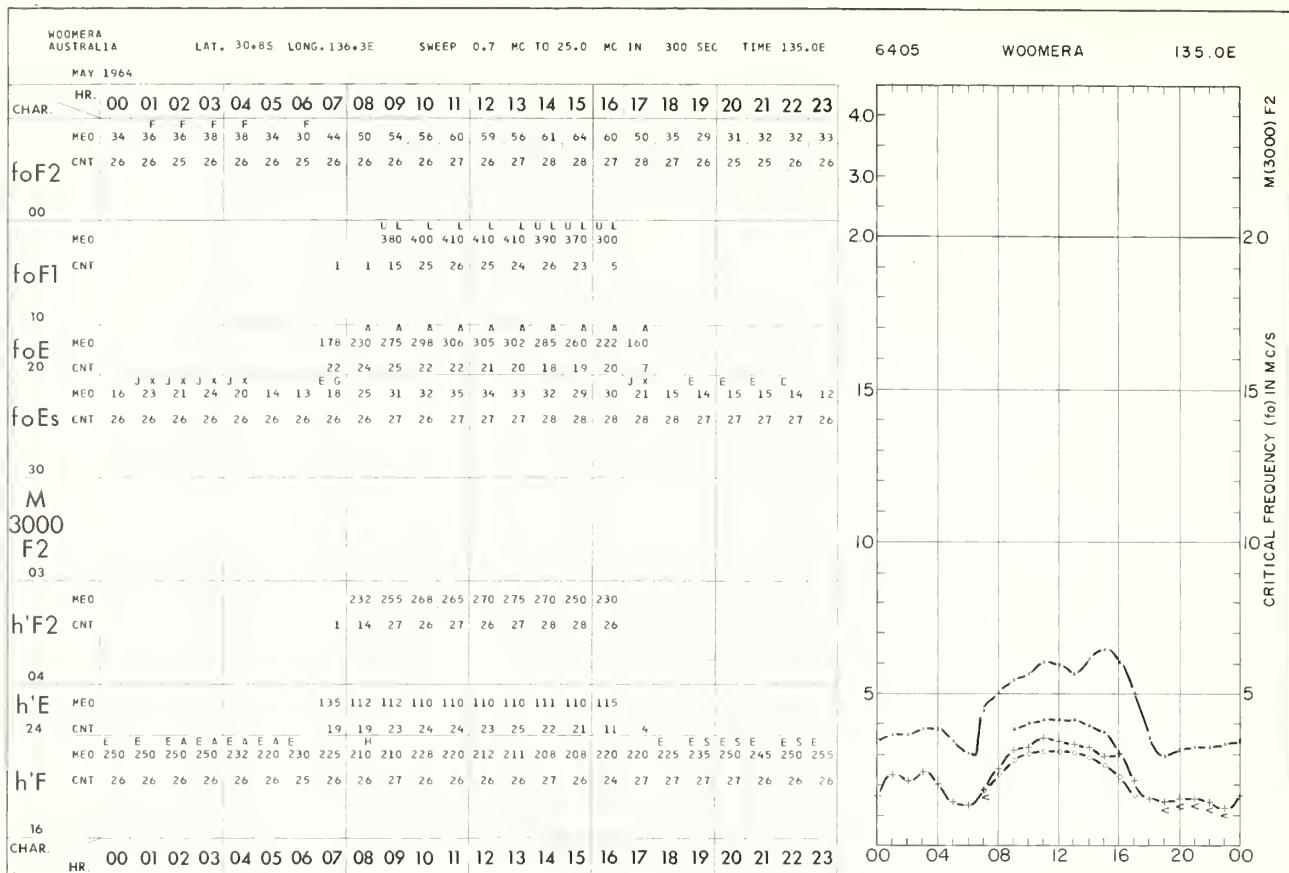




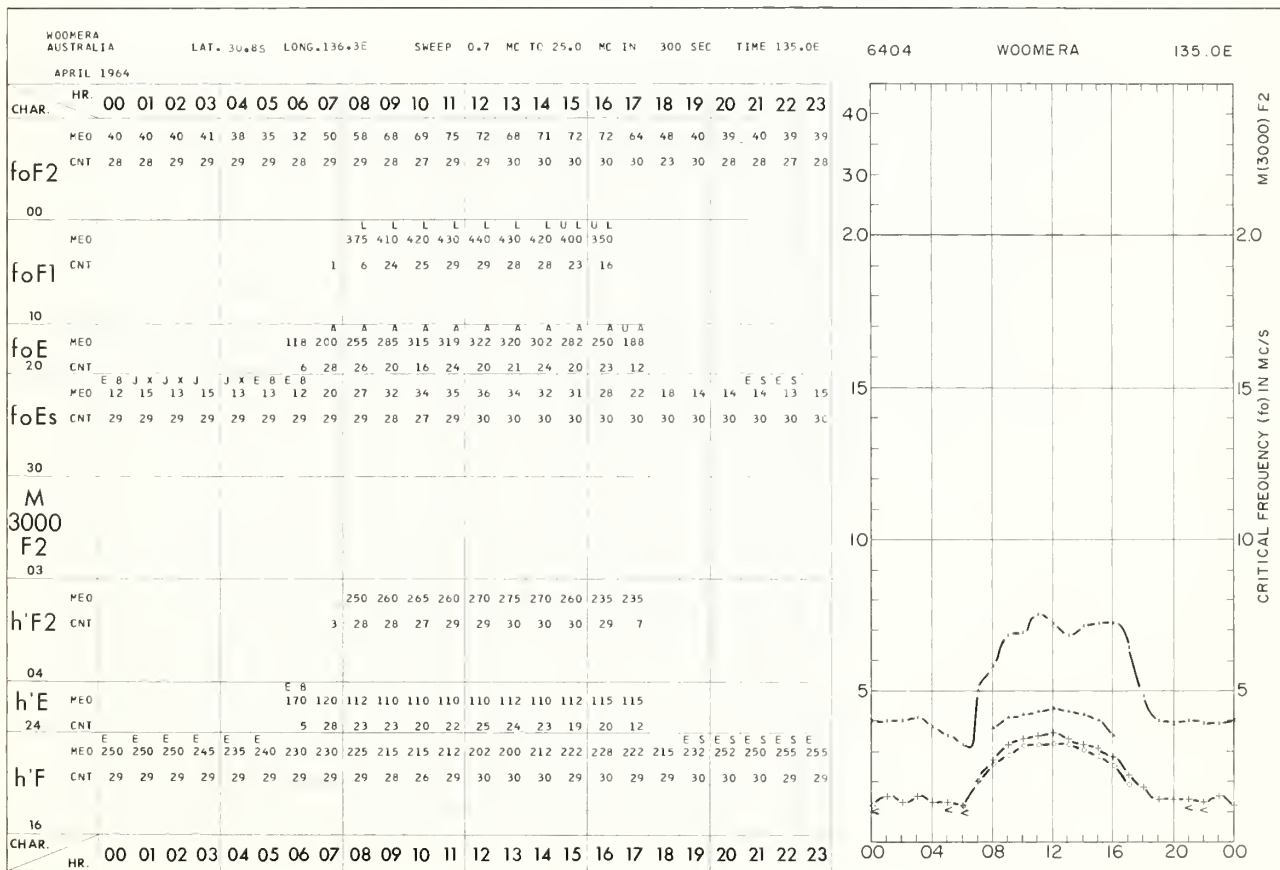
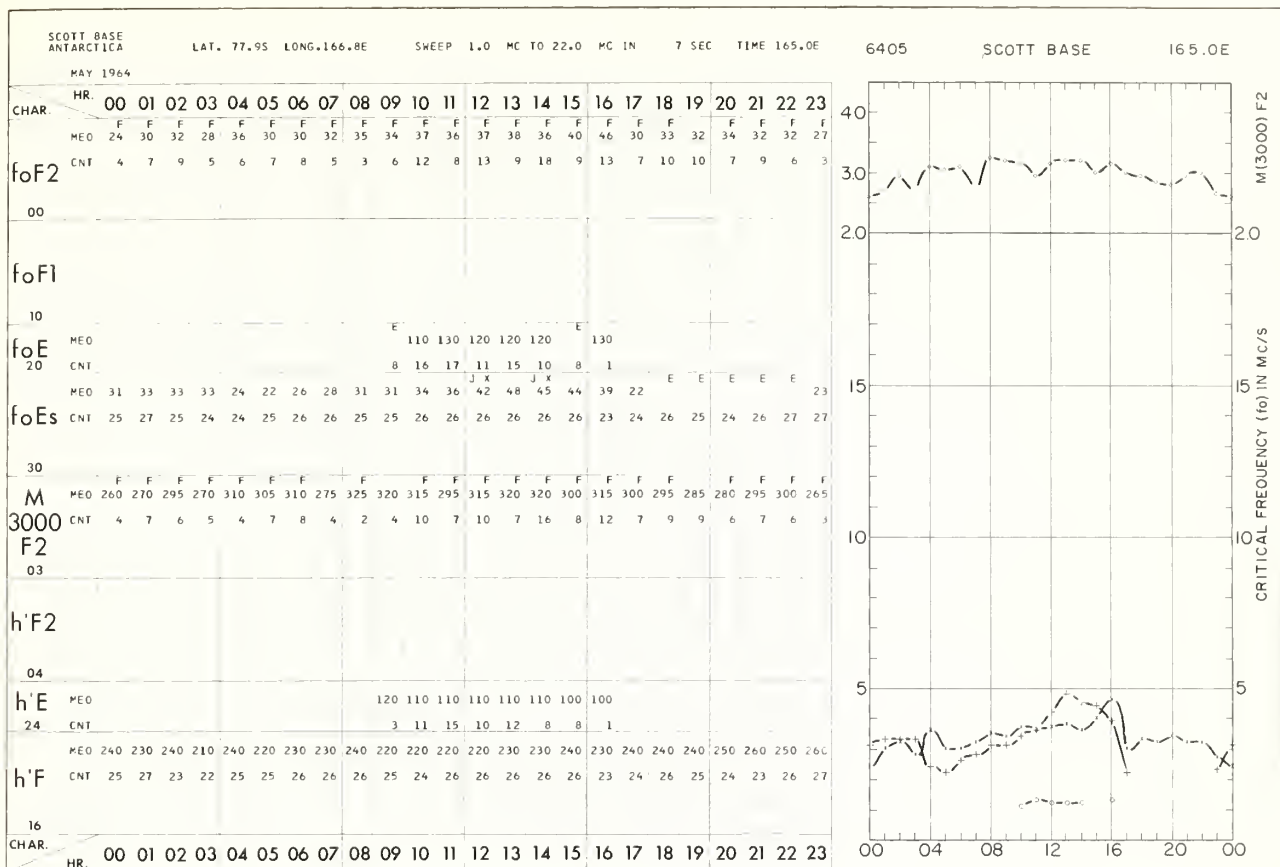












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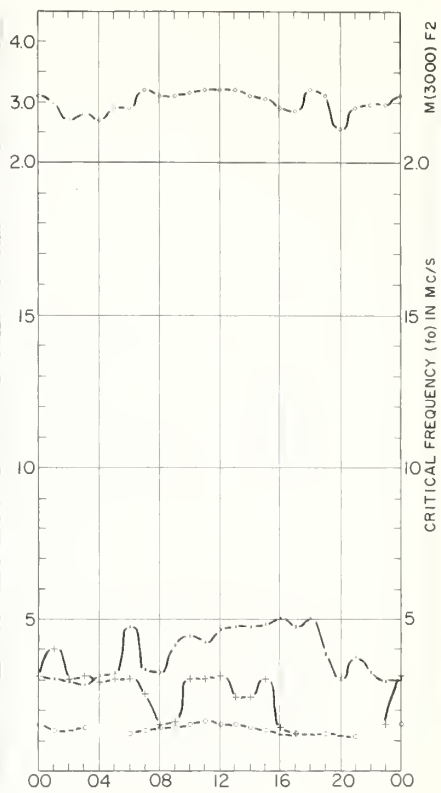
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6404

SCOTT BASE

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foF2																									
	MED	30	30	29	28	31	32	47	33	32	41	44	42	46	47	47	48	50	47	50	38	30	37	32	29
	CNT	12	6	5	7	9	6	3	5	6	10	10	16	15	16	19	18	11	5	12	9	5	5	8	9
foF1																									
foE																									
	MED	150	130																						
	CNT	2	2	1																					
foEs																									
	MED	31	40	30	31	29	30	30	25	15	16	30	30	31	24	24	30	14	12						
	CNT	24	25	28	27	27	27	26	23	27	28	26	27	27	26	27	27	22	25	27	26	26	26	24	23
M																									
3000																									
F2																									
03																									
h'F2																									
04																									
h'E																									
24																									
h'F																									
16																									
CHAR.	HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

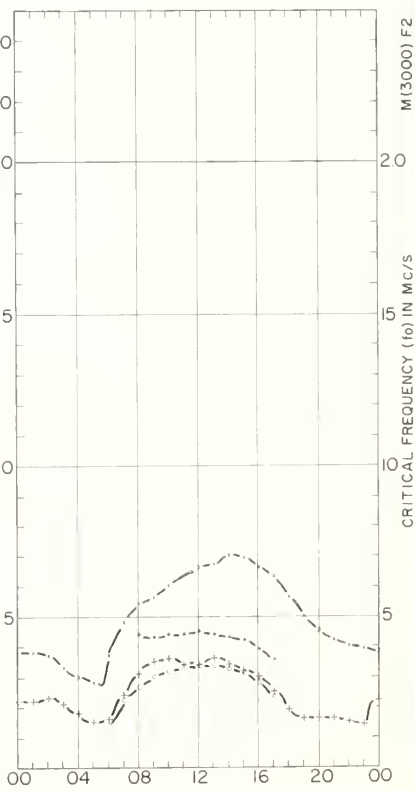


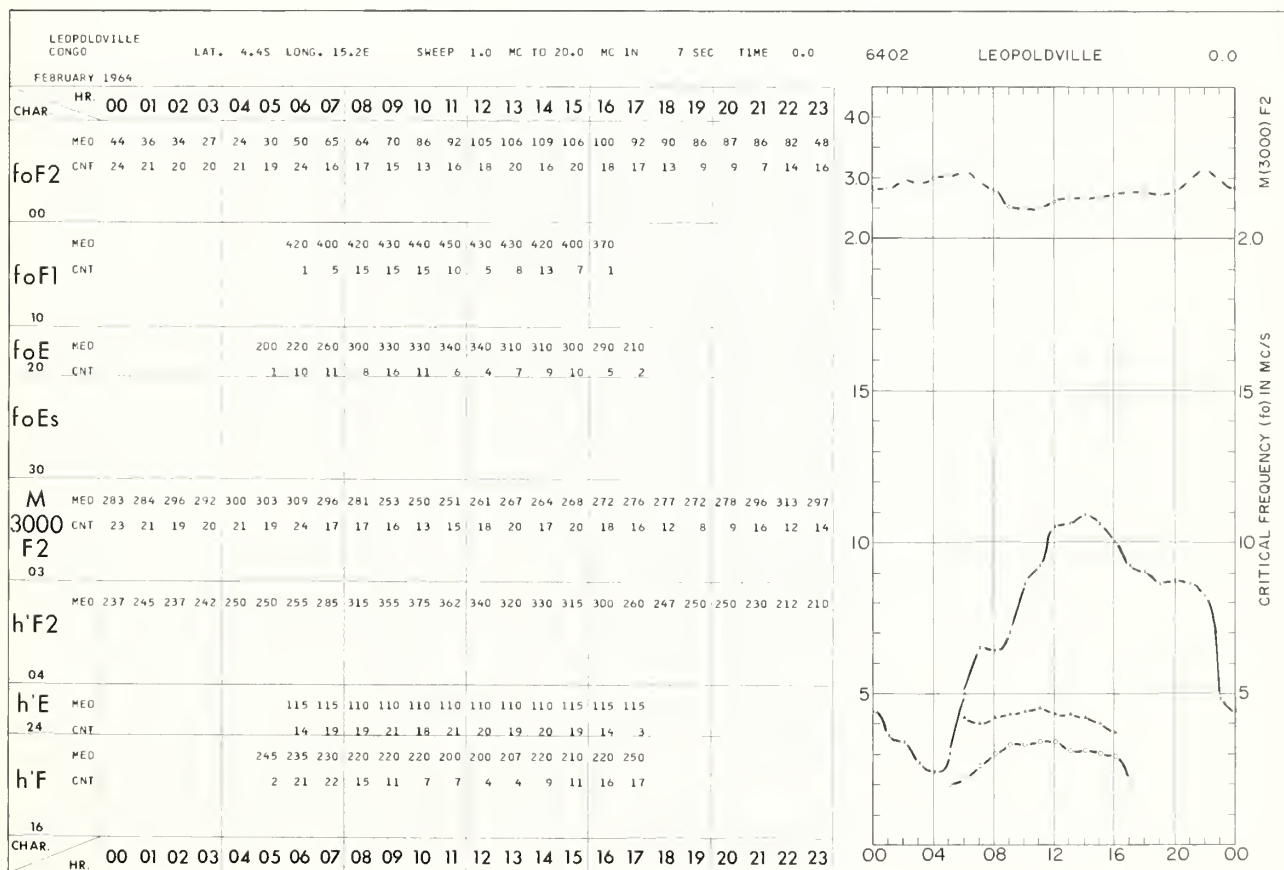
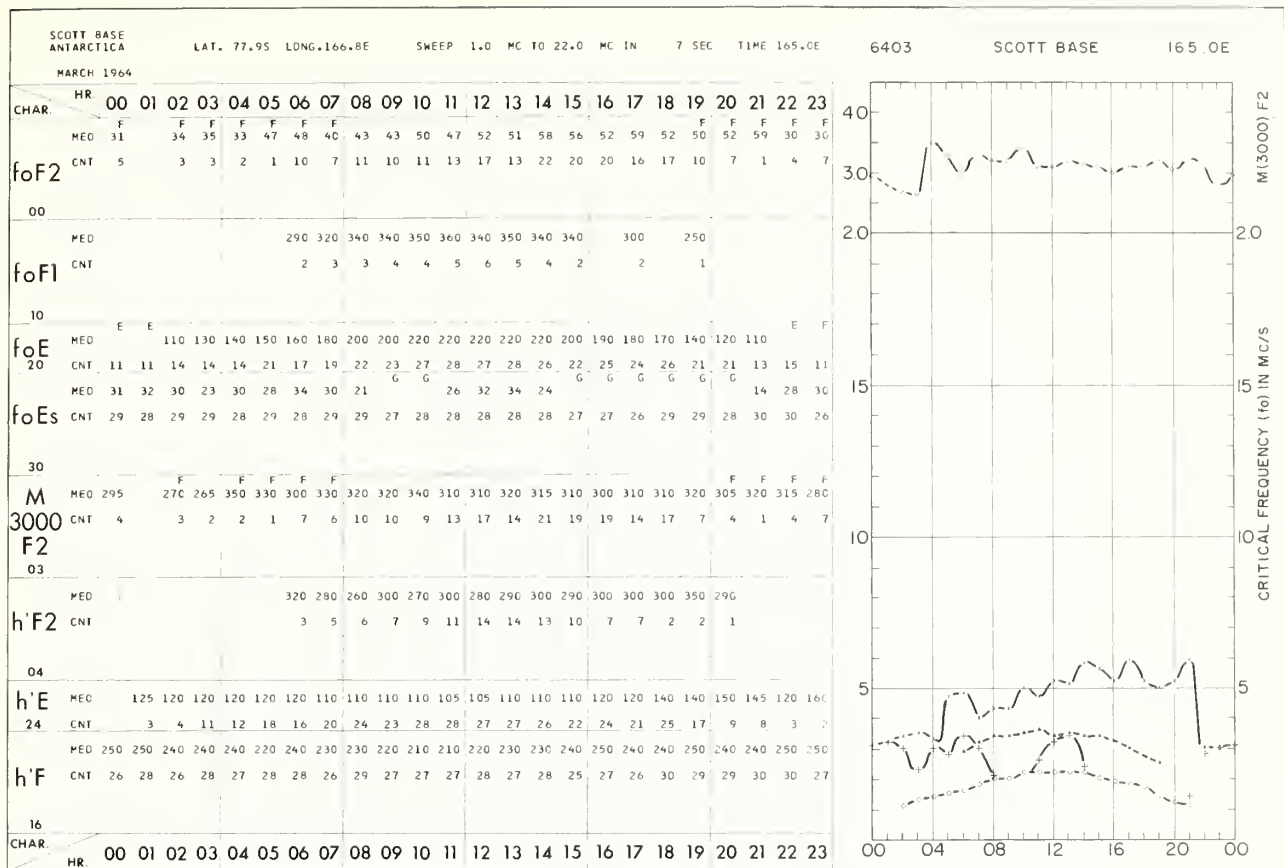
CHAR.	HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
foF2																									
	MED	38	38	37	33	30	28	37	48	54	56	60	44	66	67	70	69	66	63	56	50	45	42	40	39
	CNT	20	22	21	23	20	19	23	22	21	22	21	20	19	21	21	21	22	23	18	22	23	22	23	23
foF1																									
	MED																								
	CNT																								
foE																									
	MED																								
	CNT																								
foEs																									
	MED																								
	CNT																								
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h'E																									
24																									
h'F																									
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CHAR.	HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

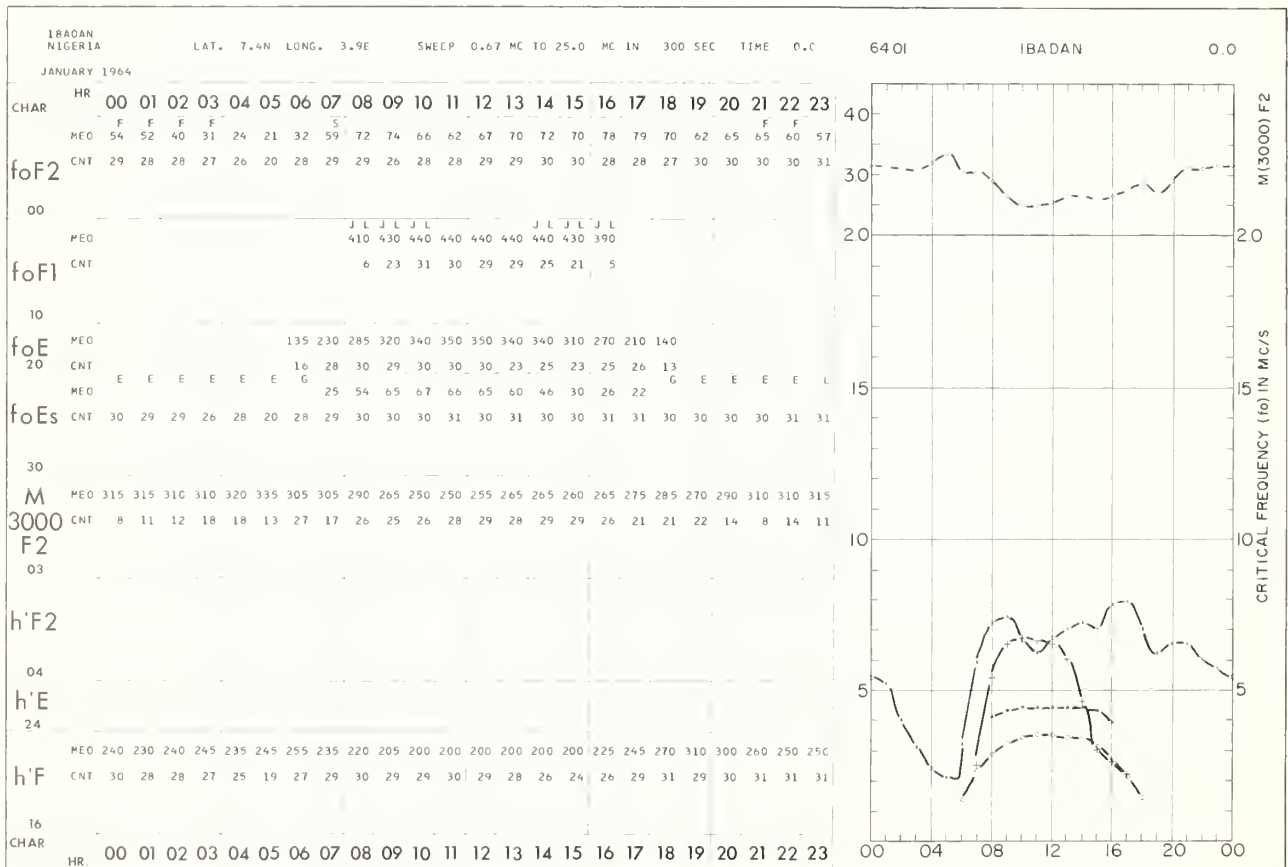
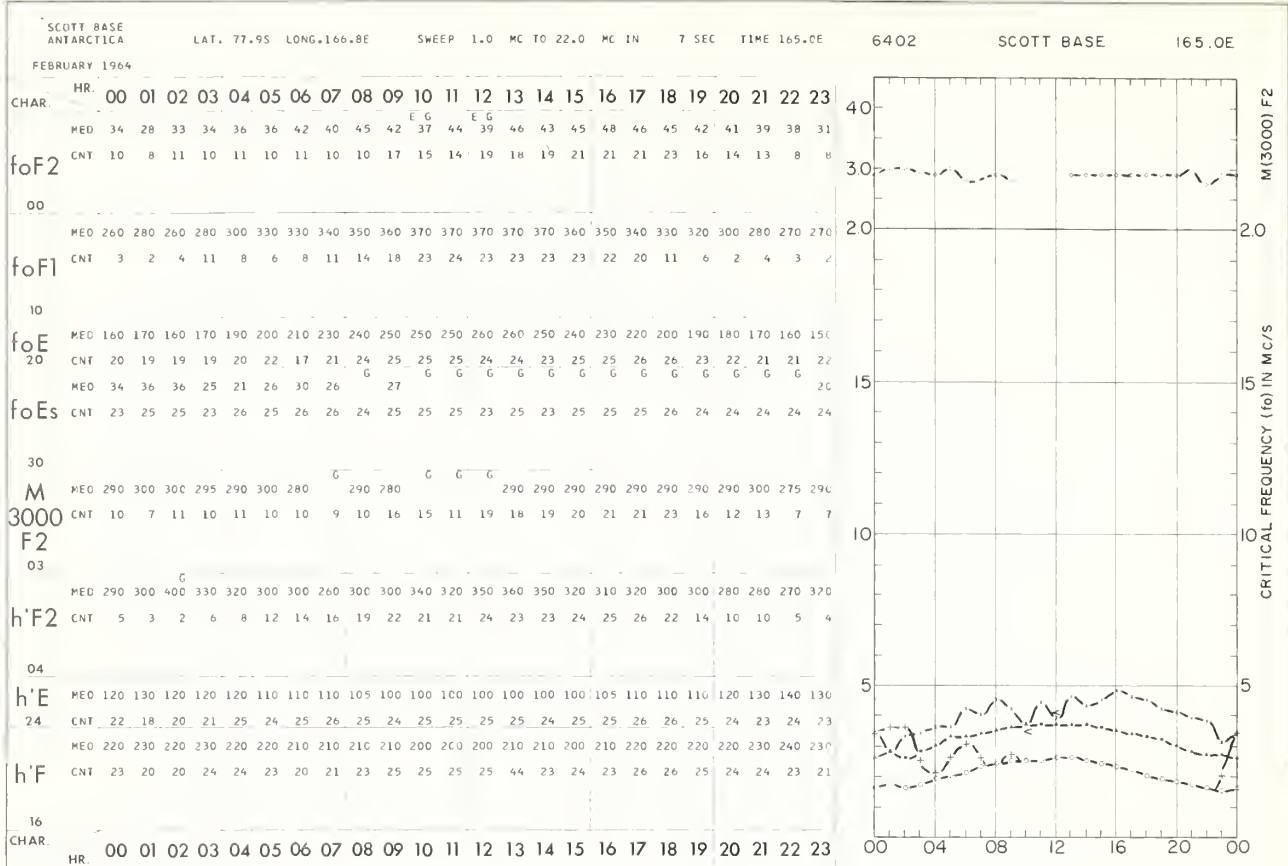
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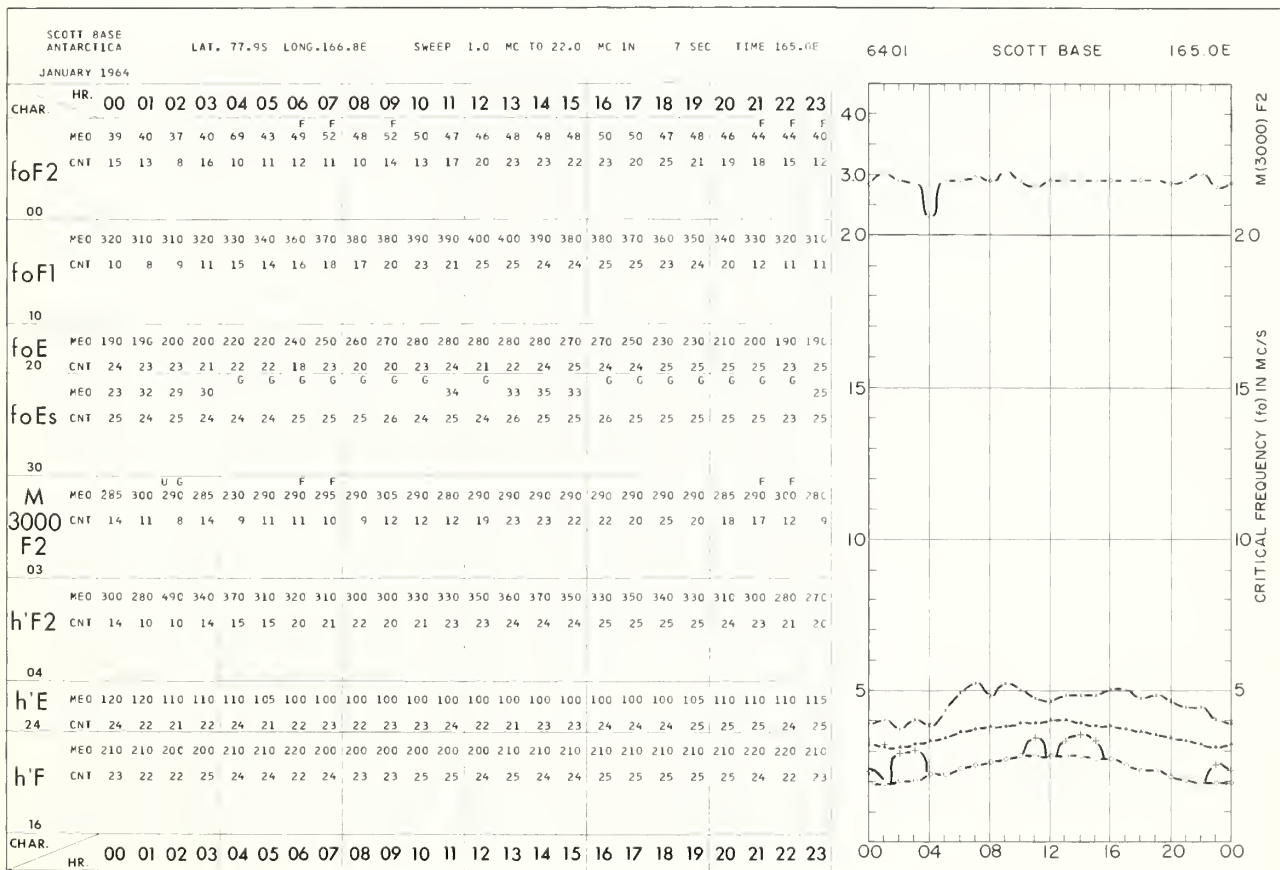
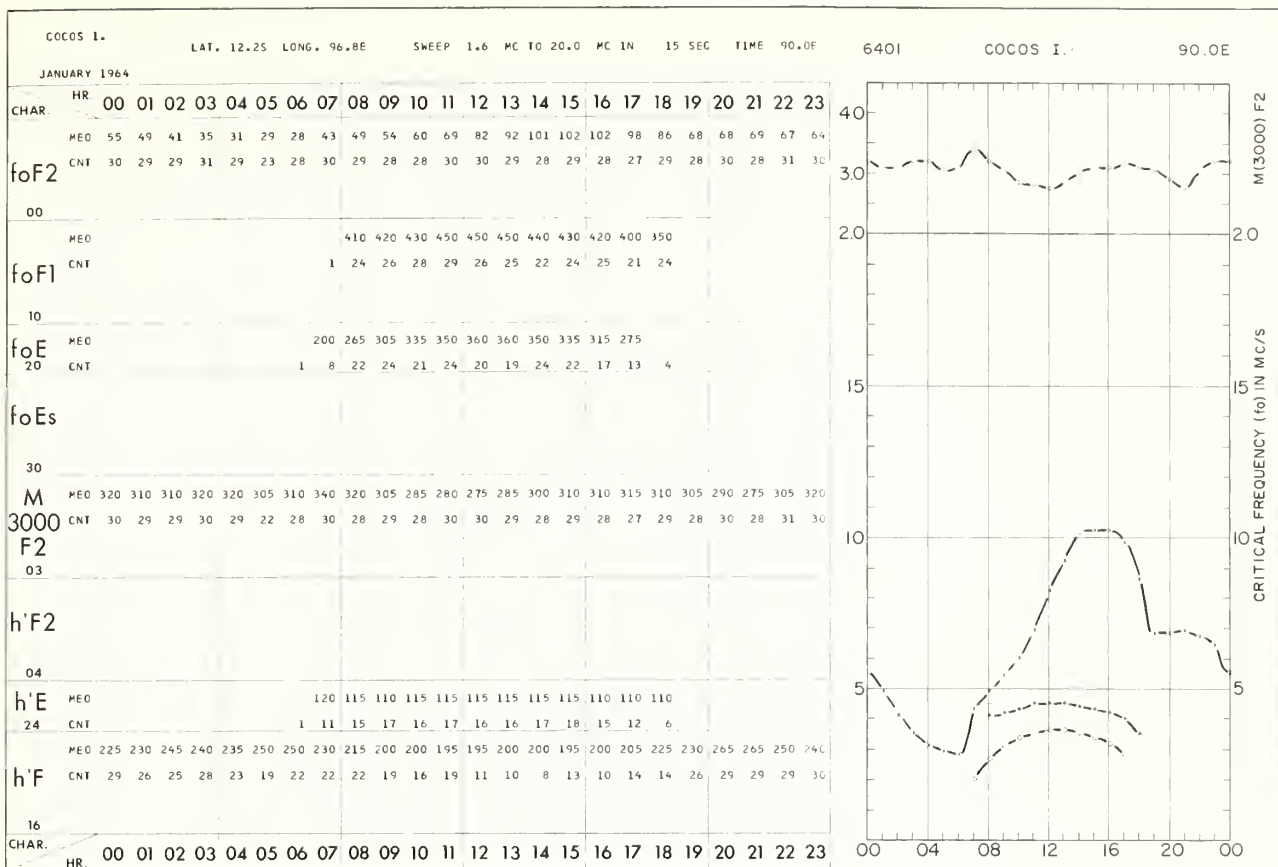
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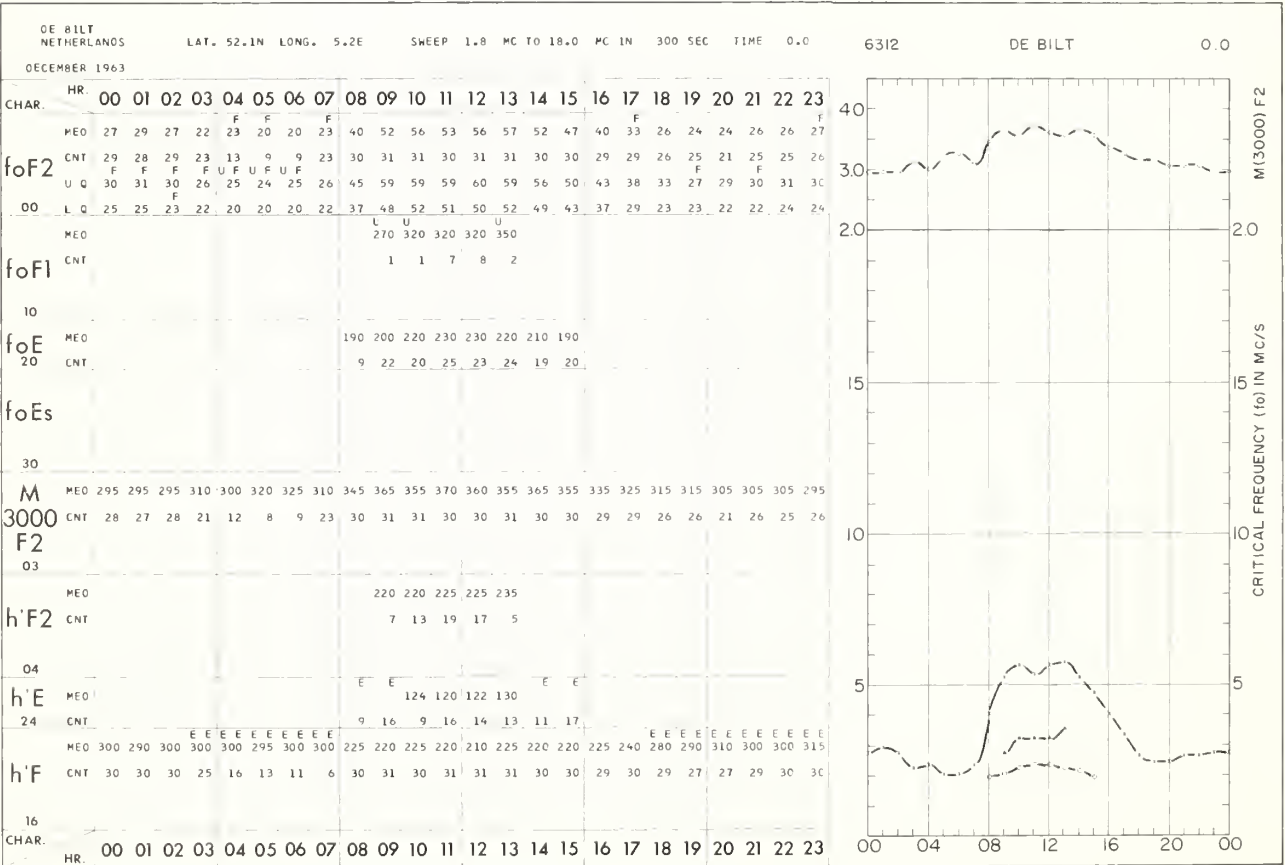
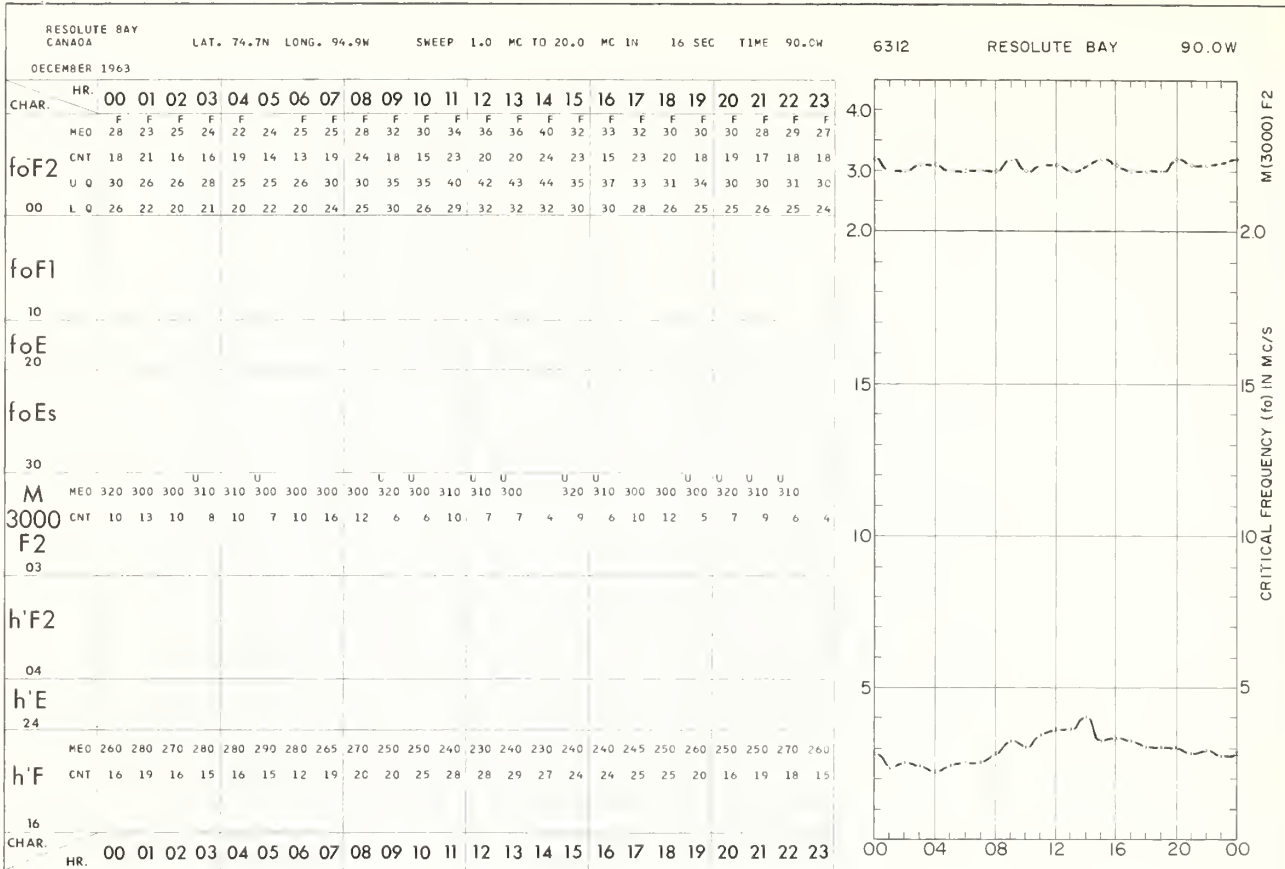


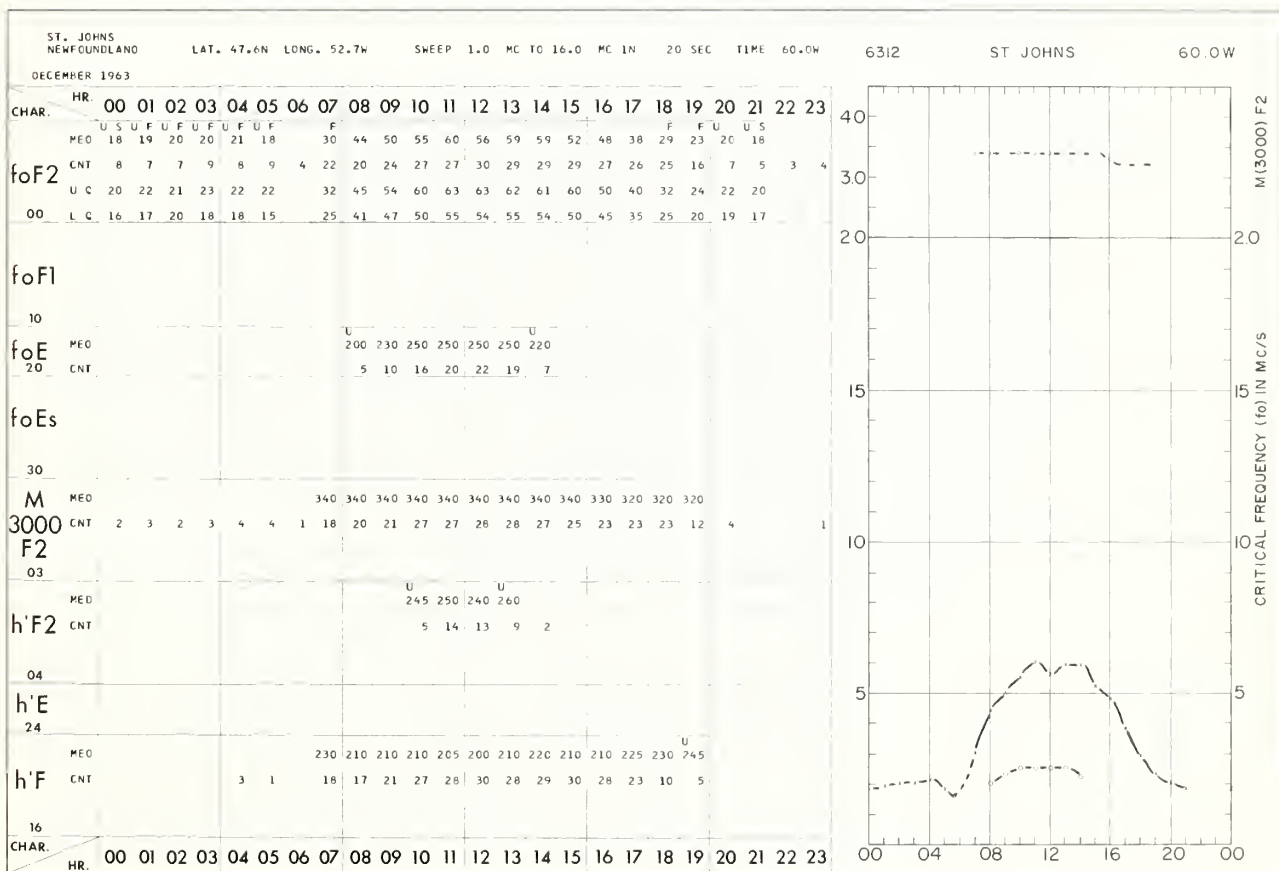
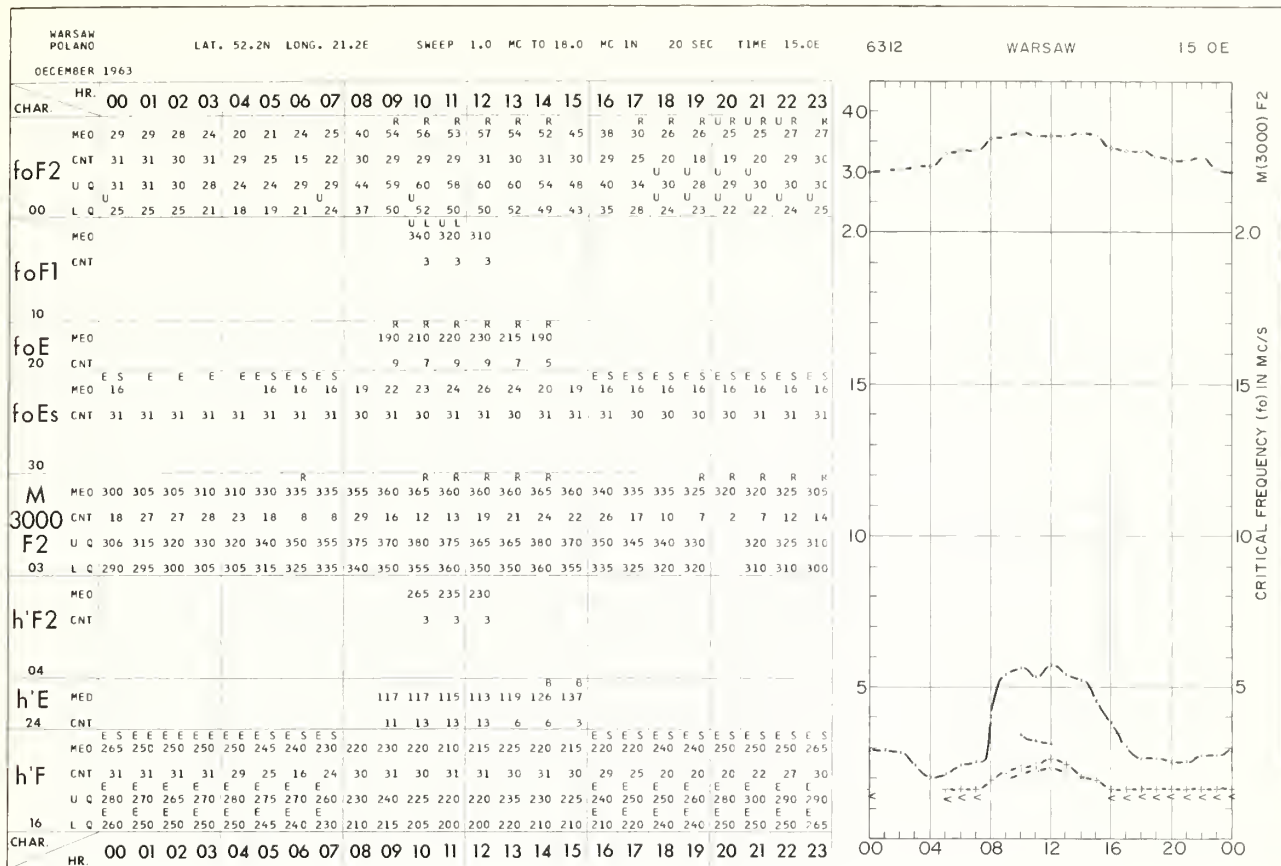


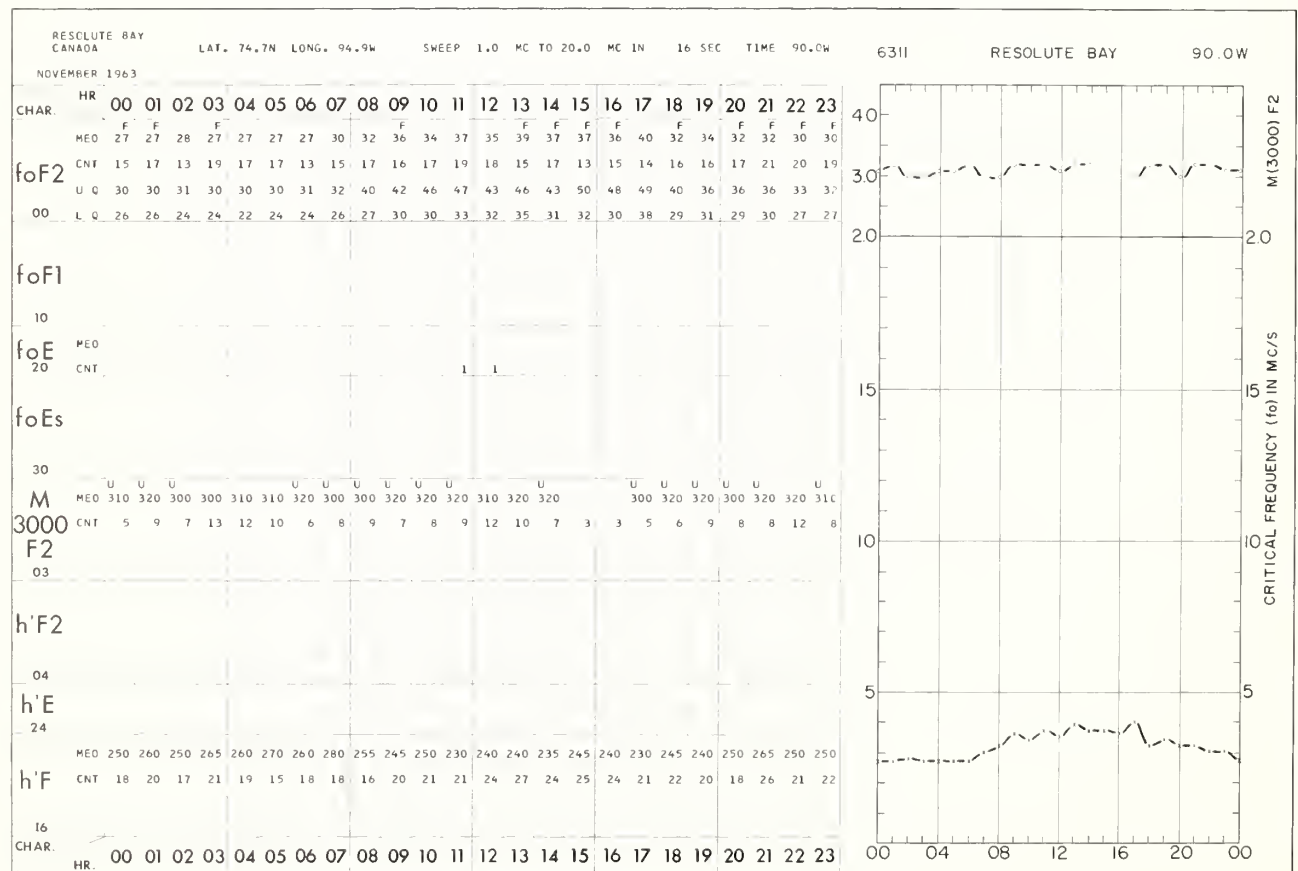
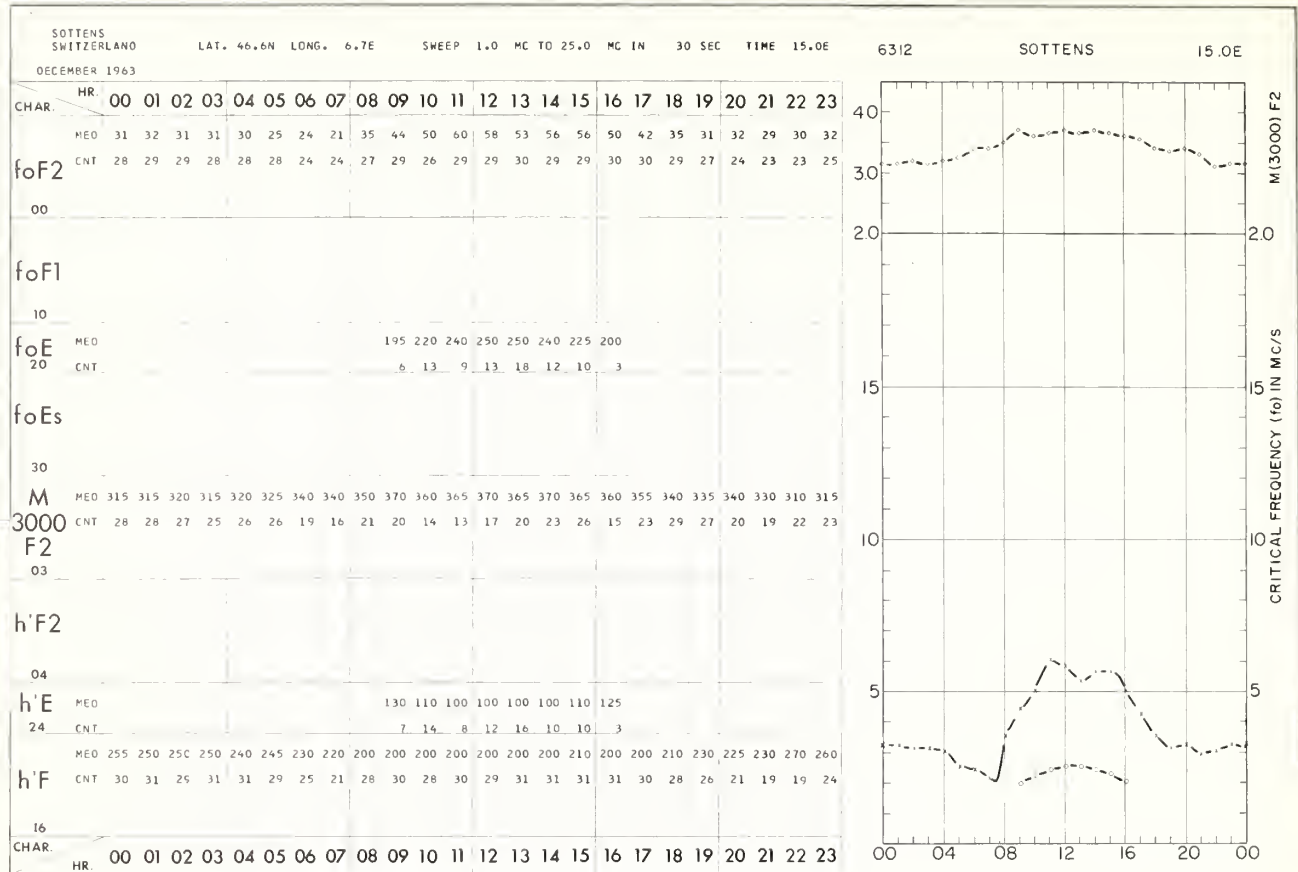




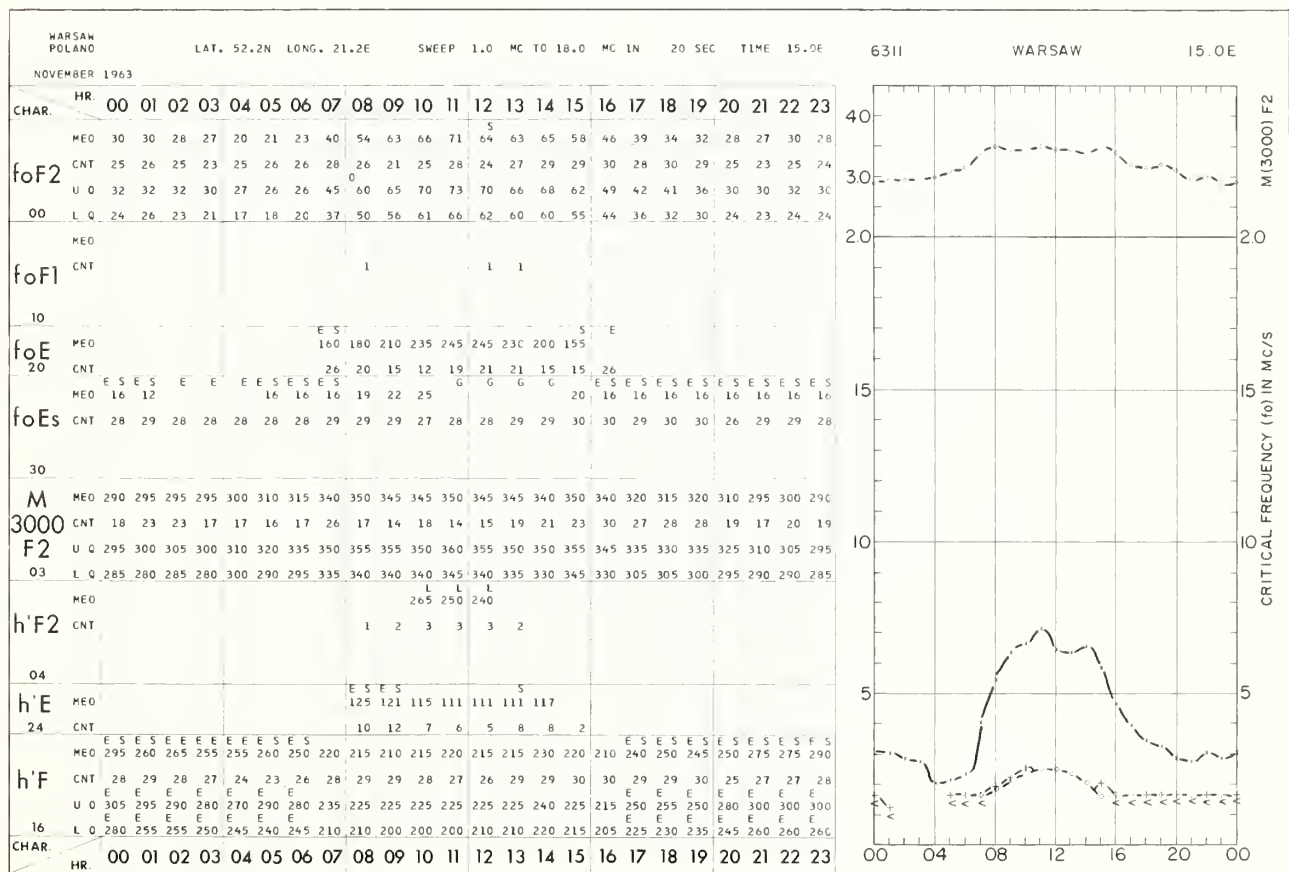
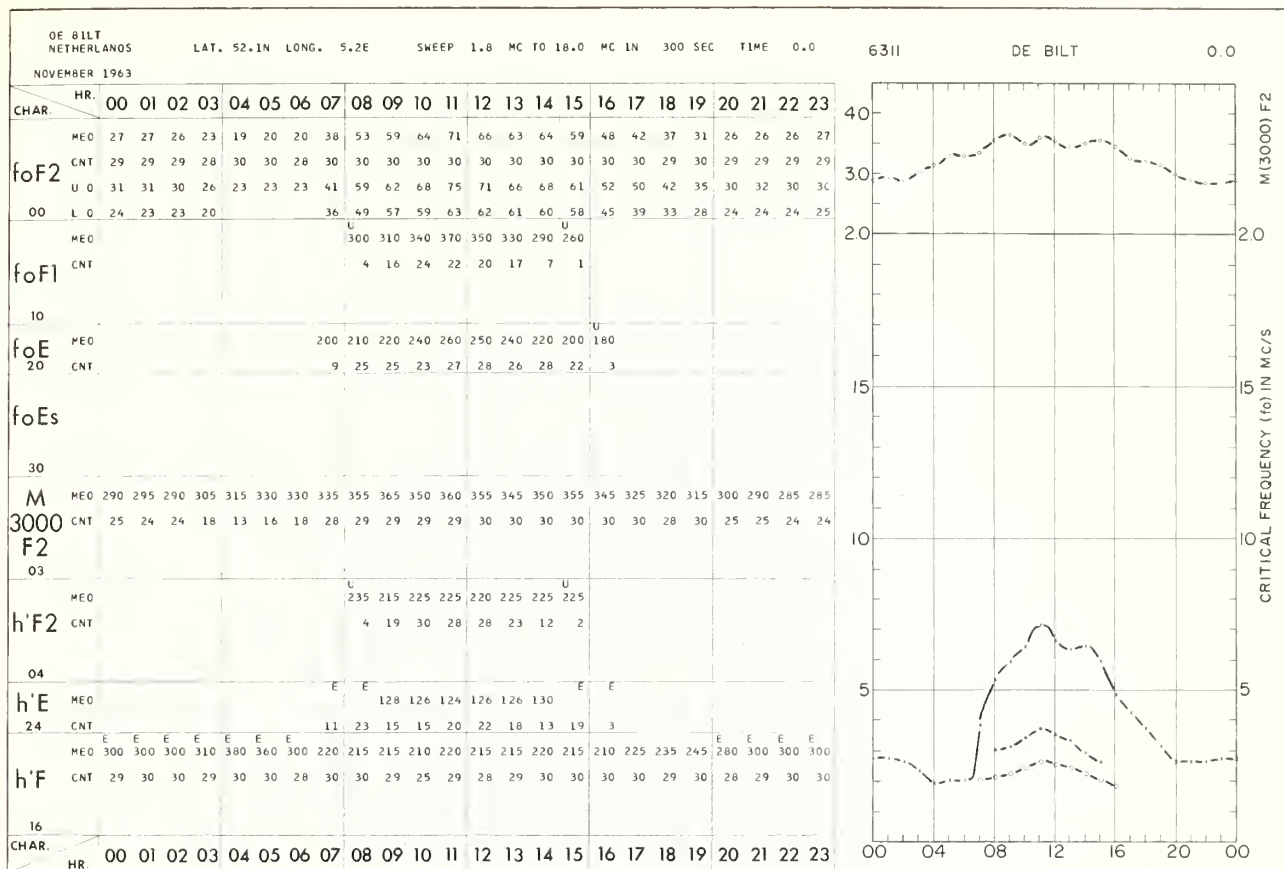


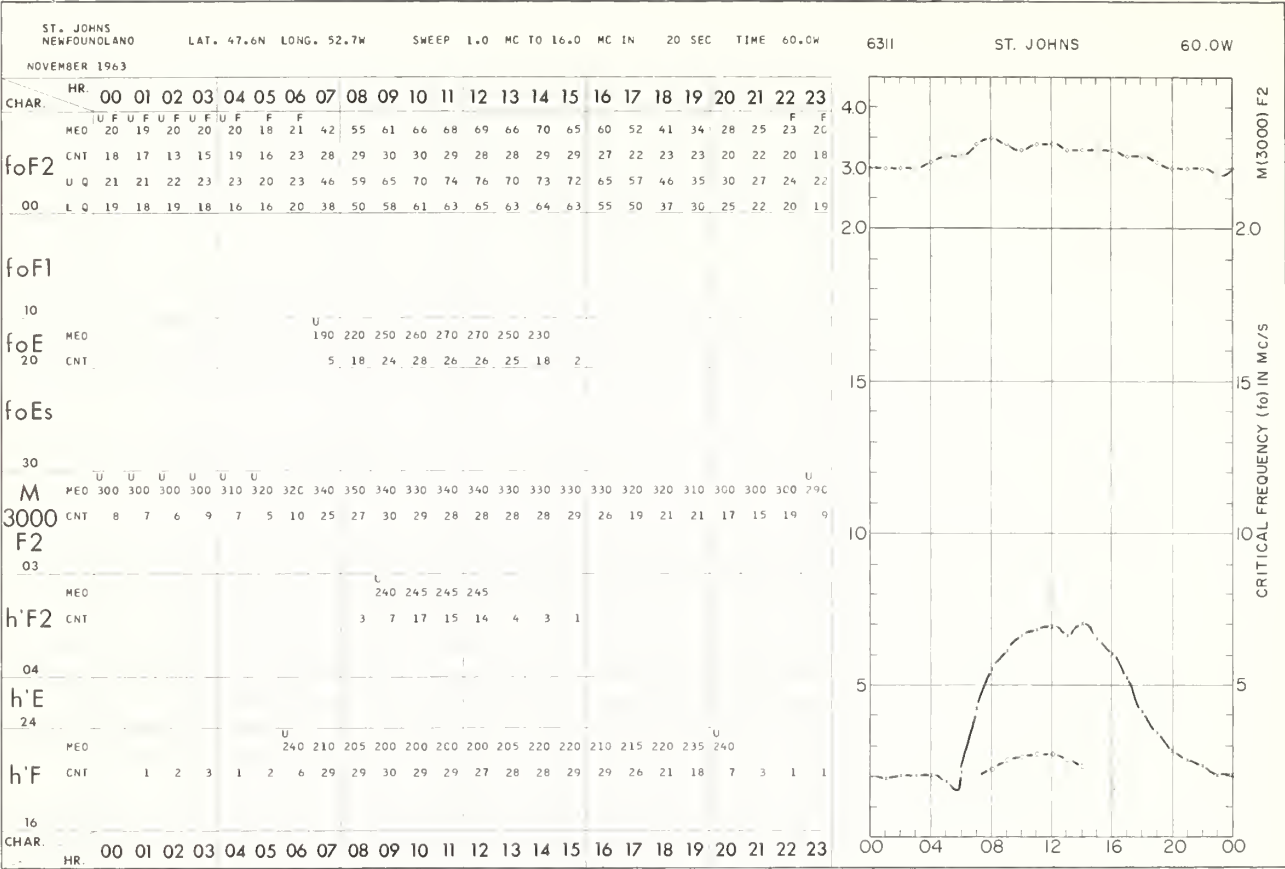












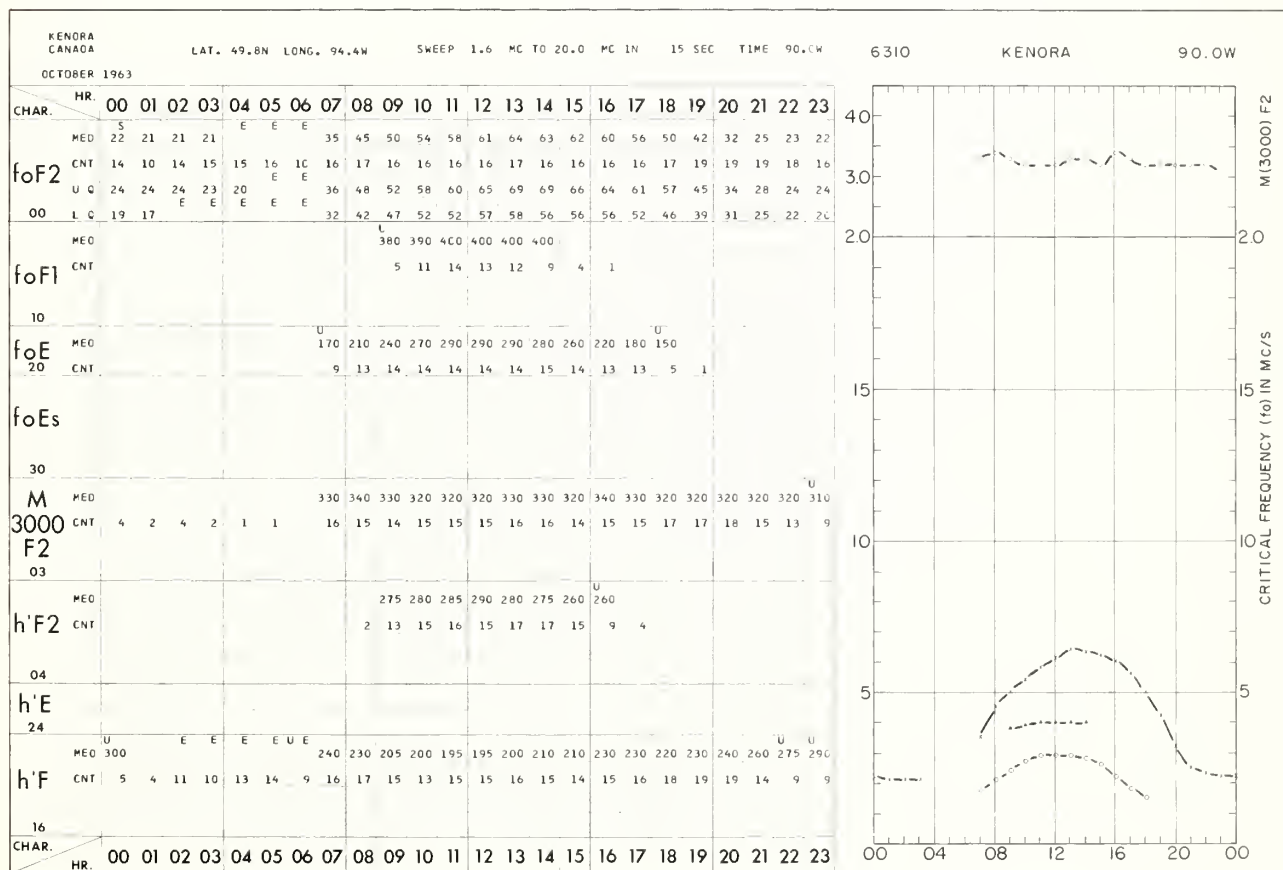
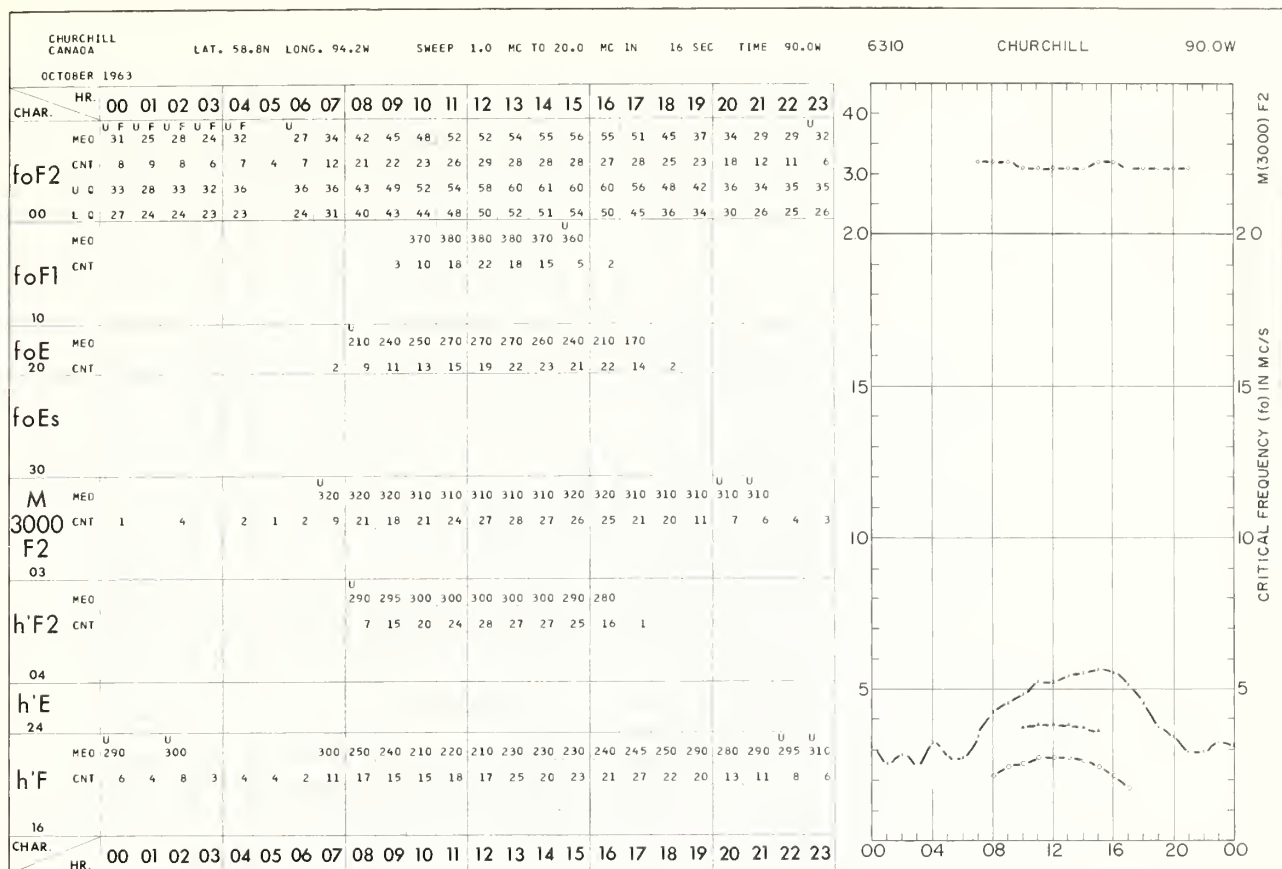
SOTTENS  
SWITZERLAND

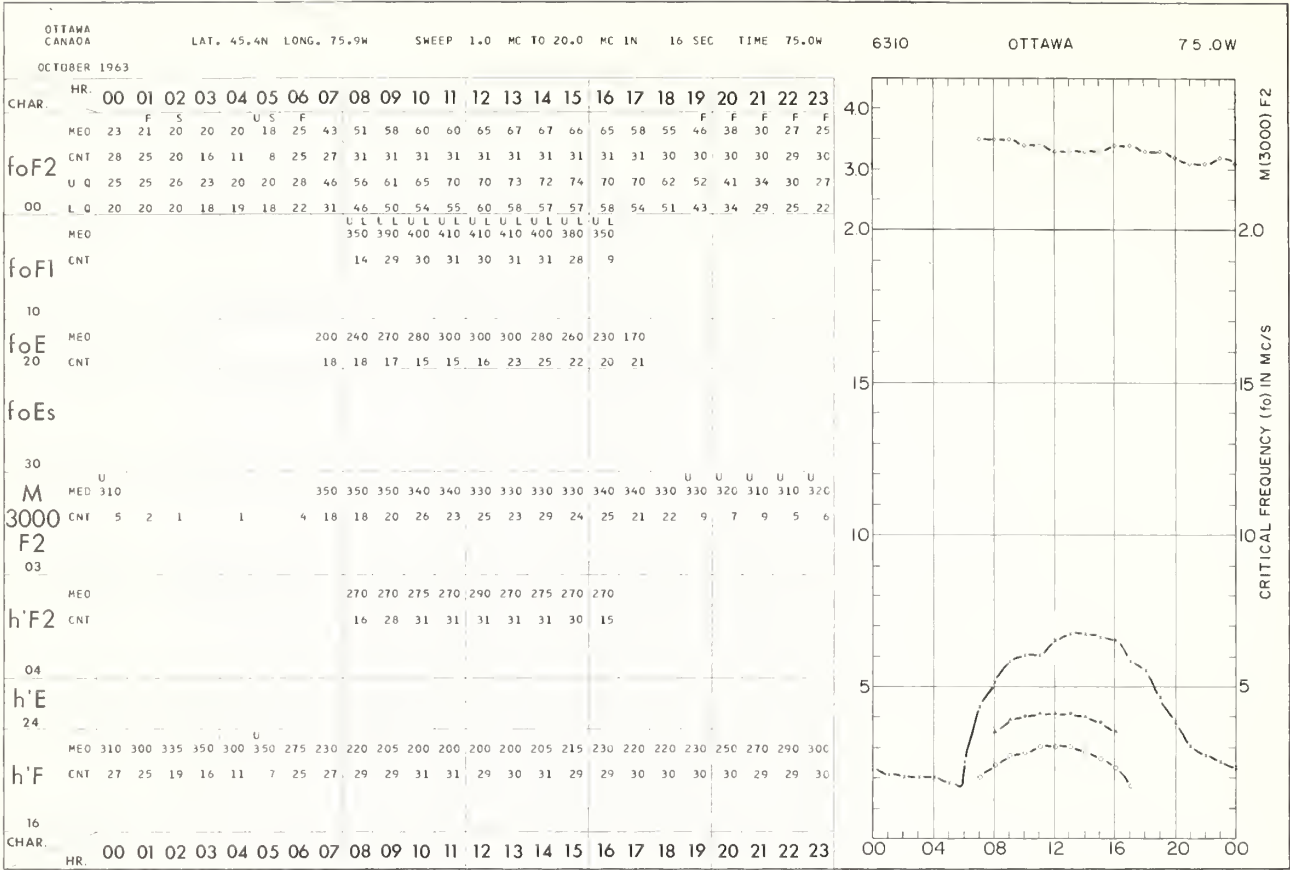
LAT. 46.6N LONG. 6.7E

SWEEP 1.0 MC TO 25.0 MC IN 30 SEC TIME 15.0E

6311 SOTTENS 15.0E

NOVEMBER 1963





TEHRAN  
IRAN

OCTOBER 1963

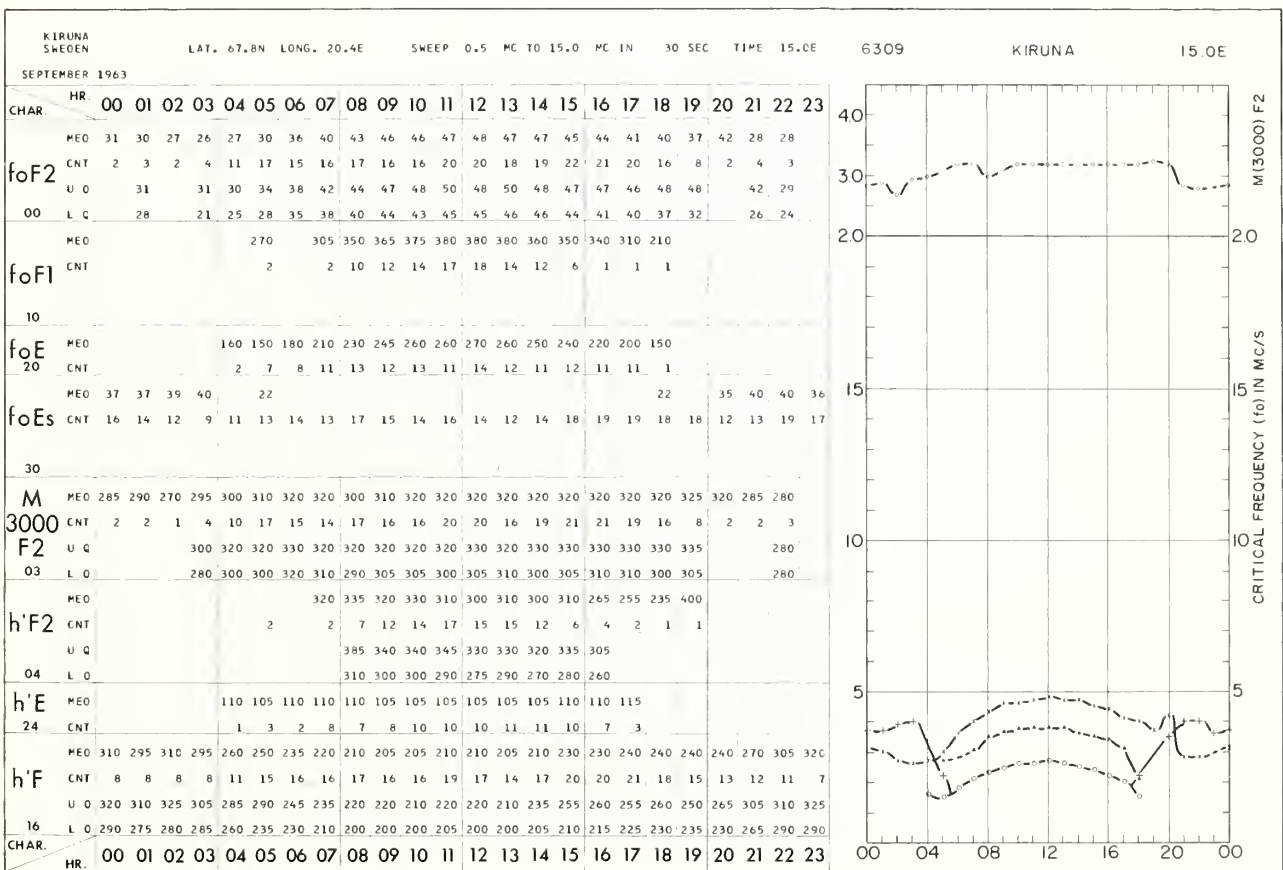
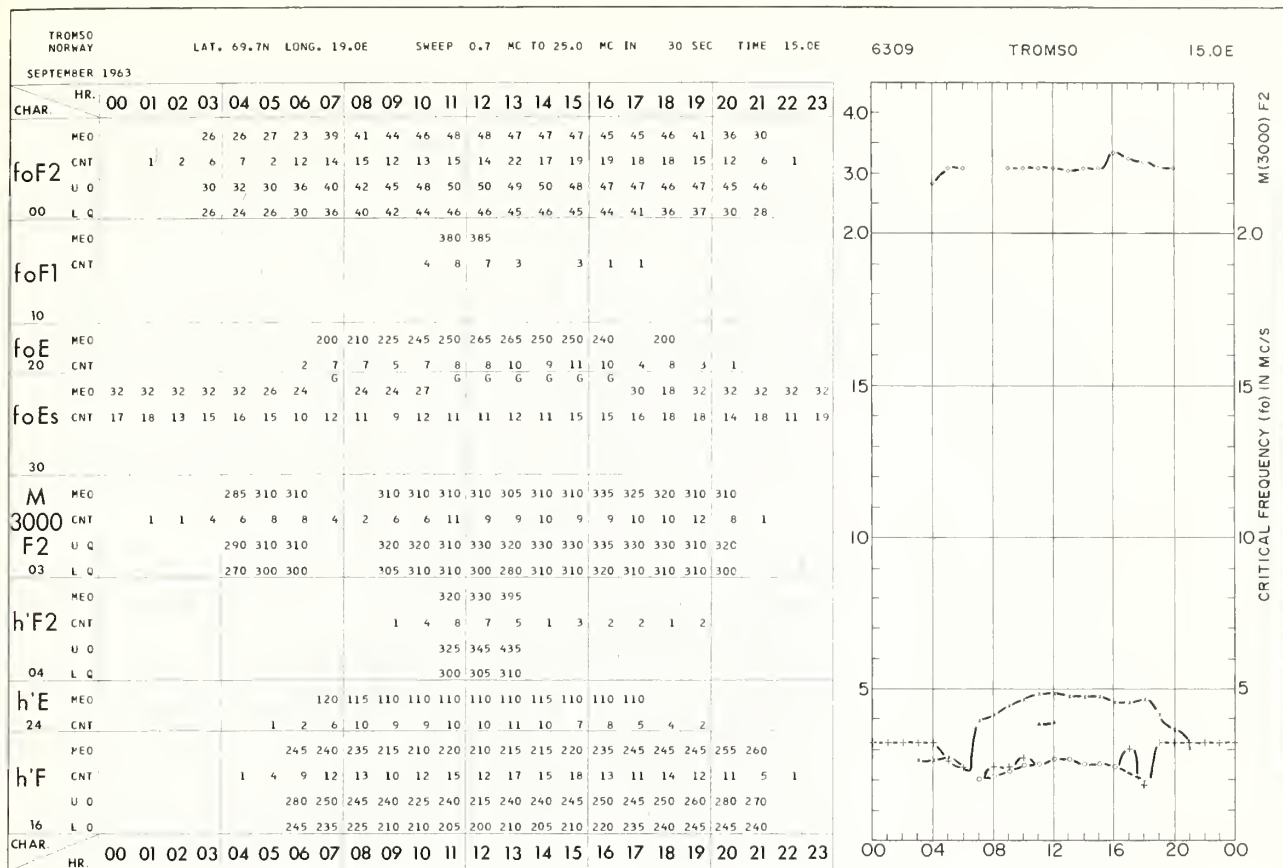
LAT. 35.7N LONG. 51.4E

SWEEP 1.0 MC TO 15.0 MC IN 20 SEC TIME 52.5E

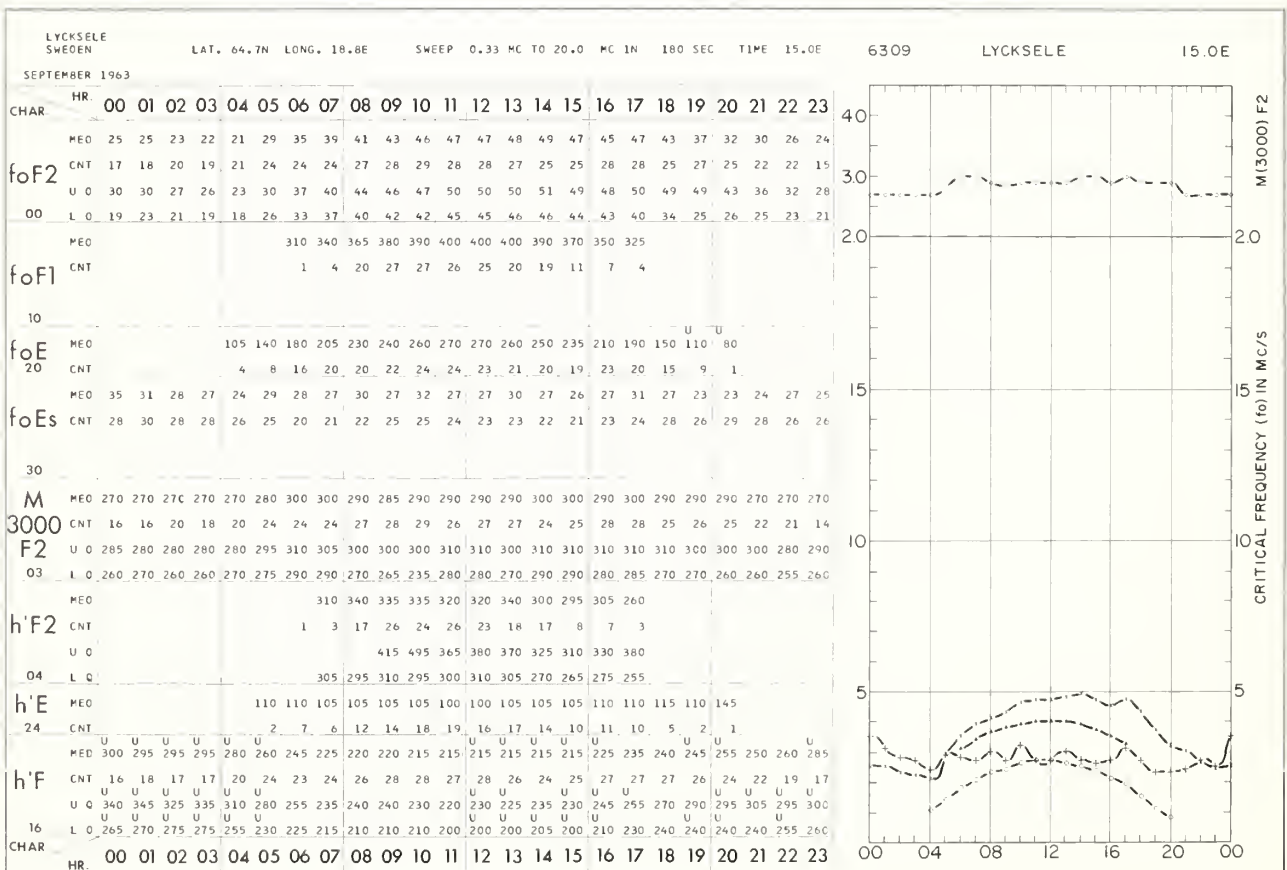
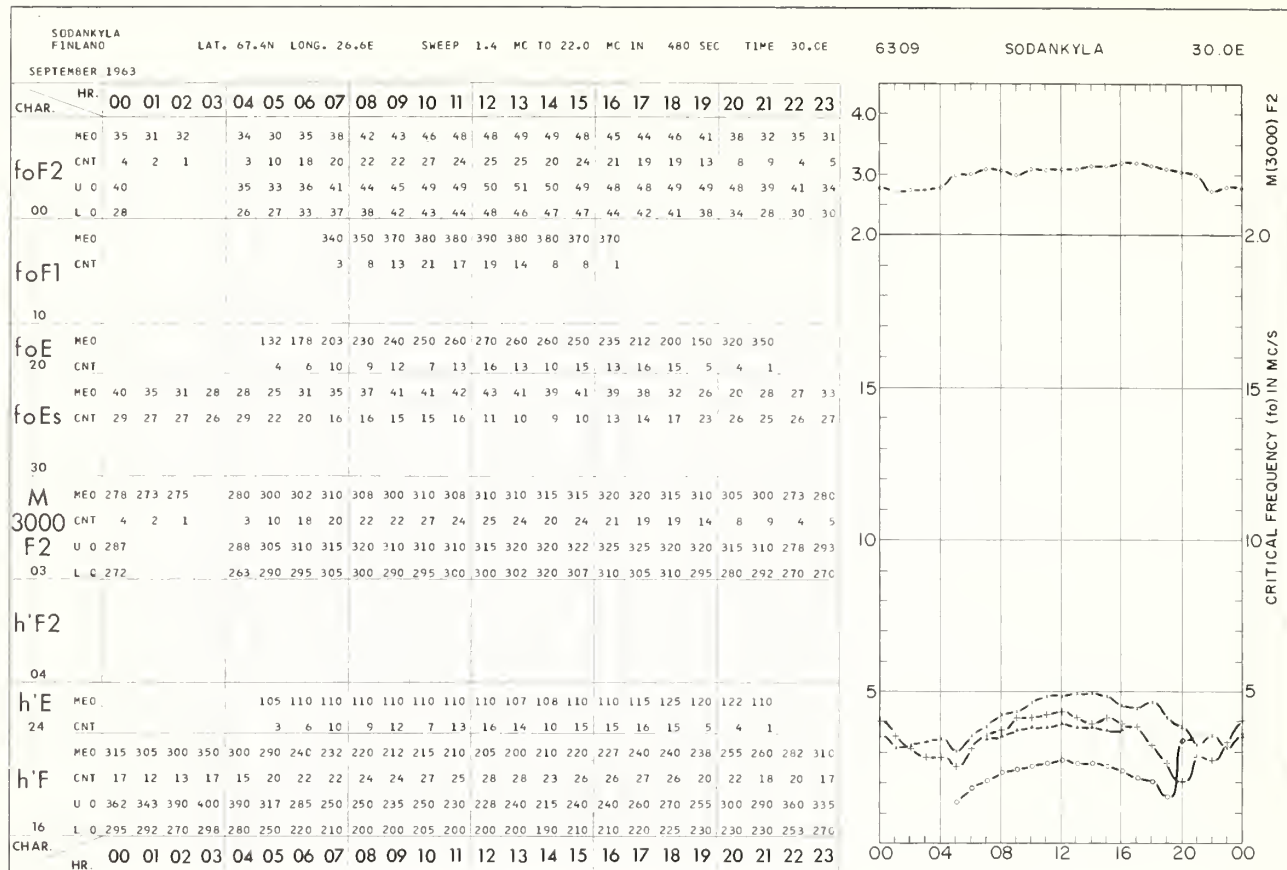
6310

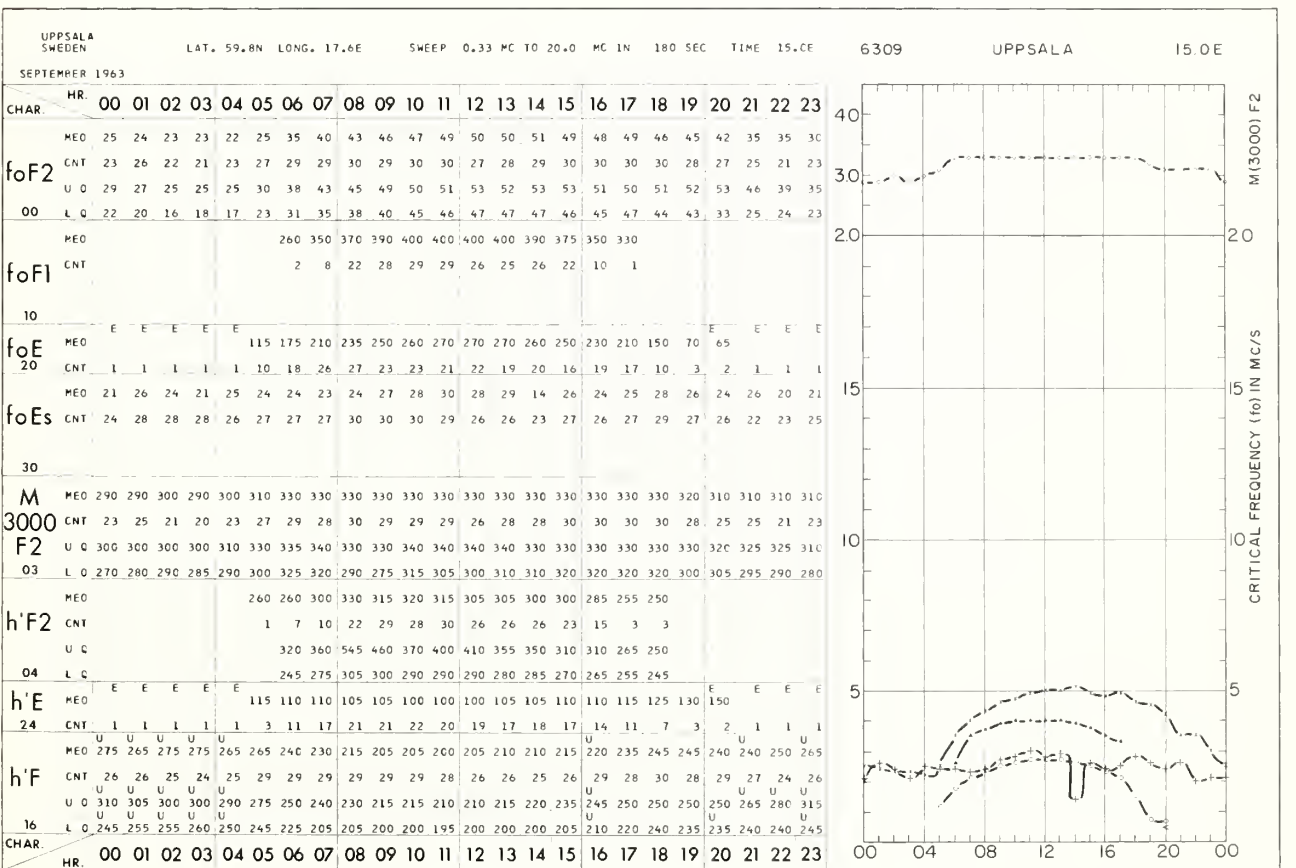
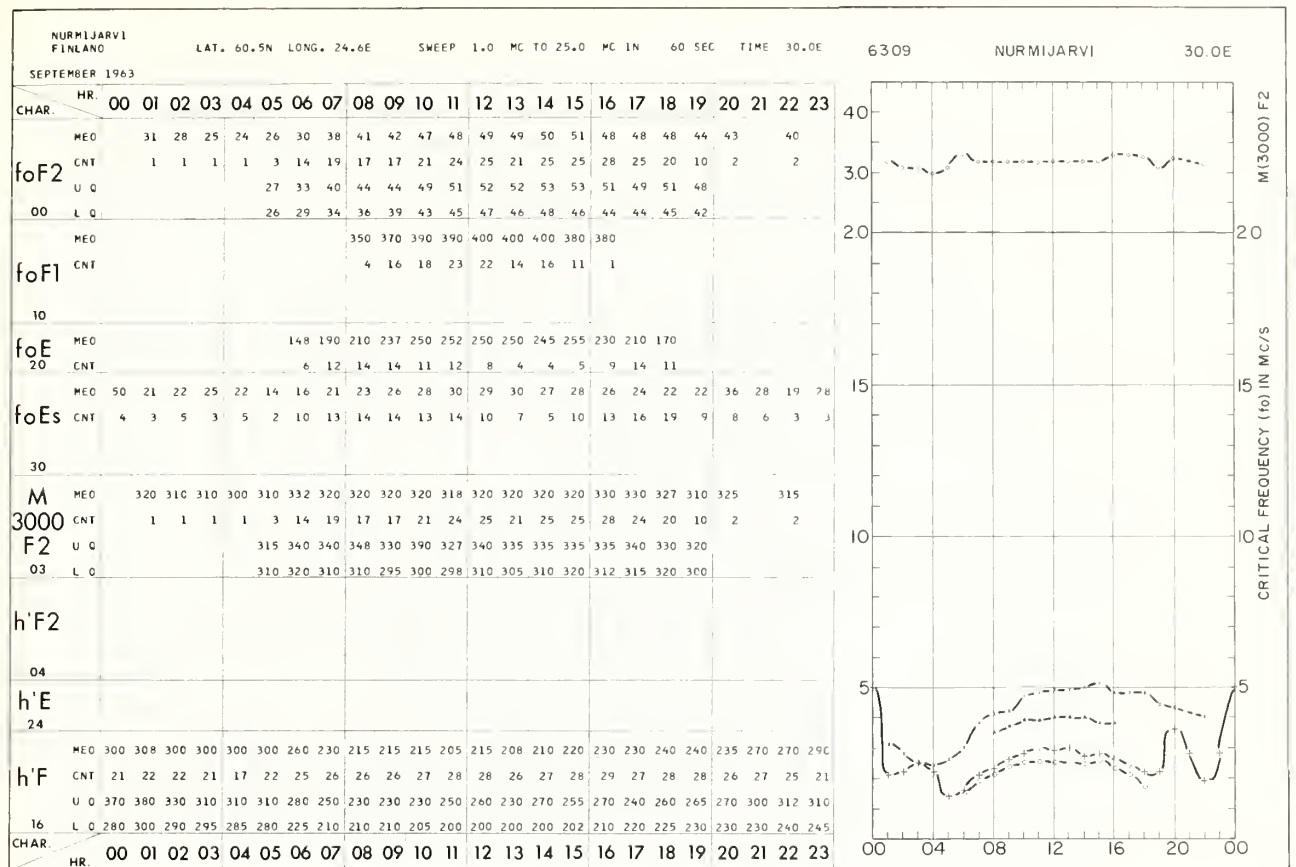
TEHRAN

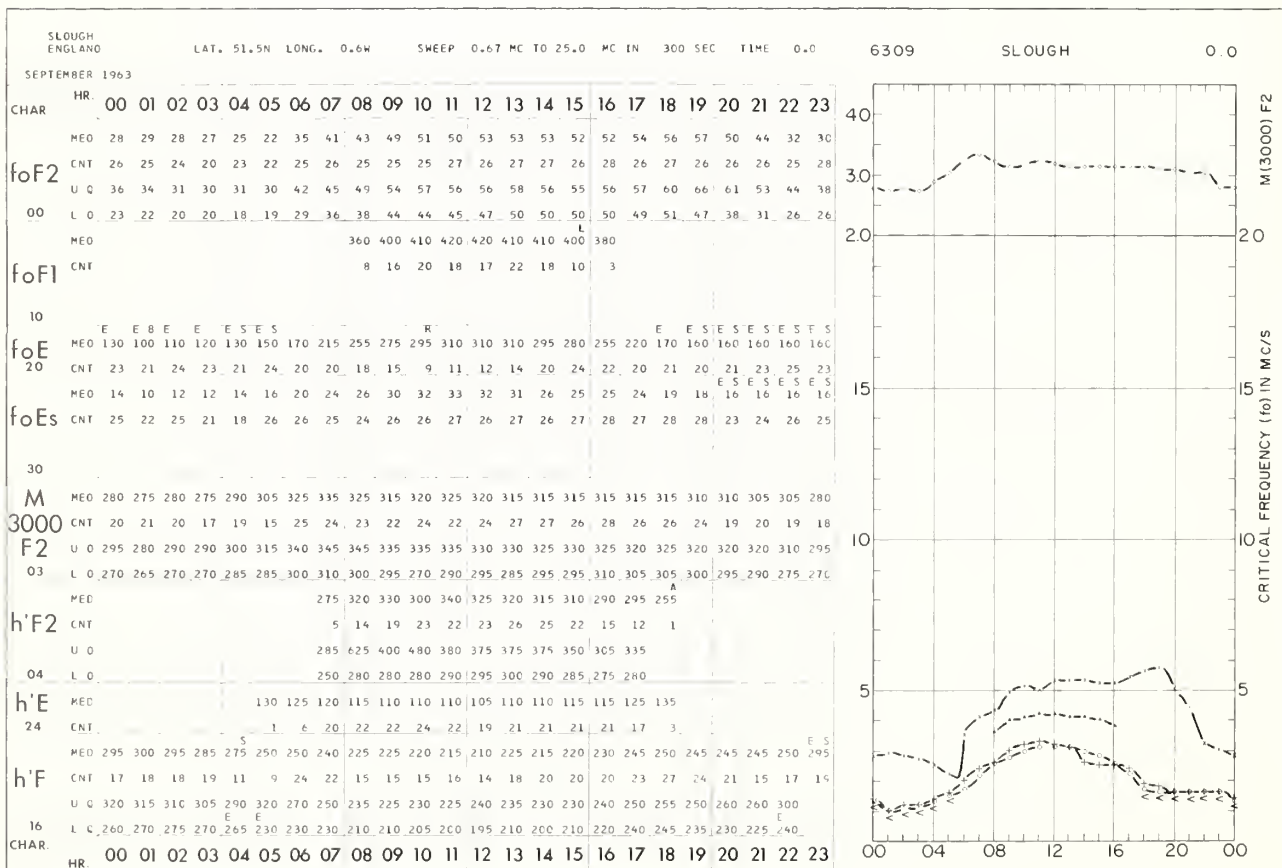
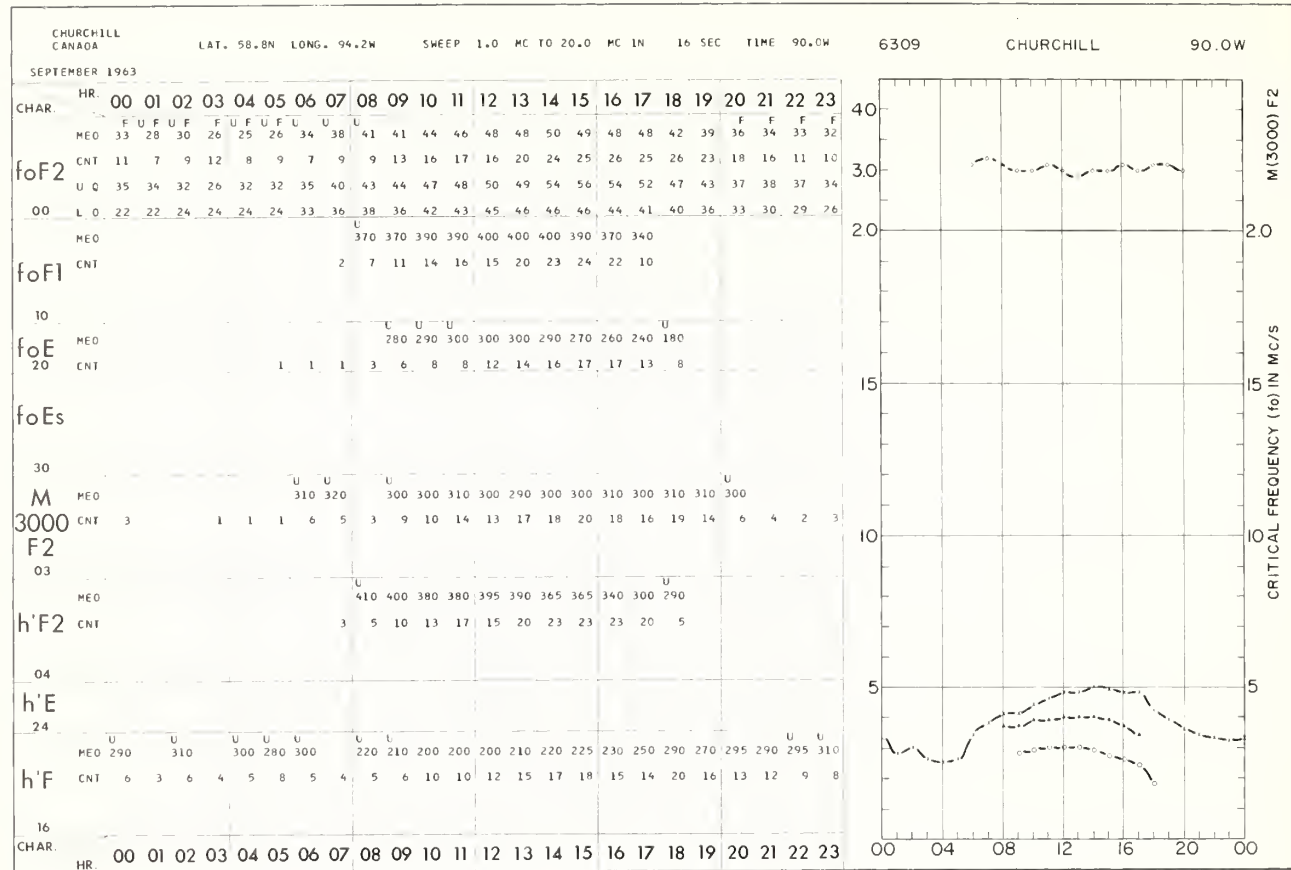
52.5E



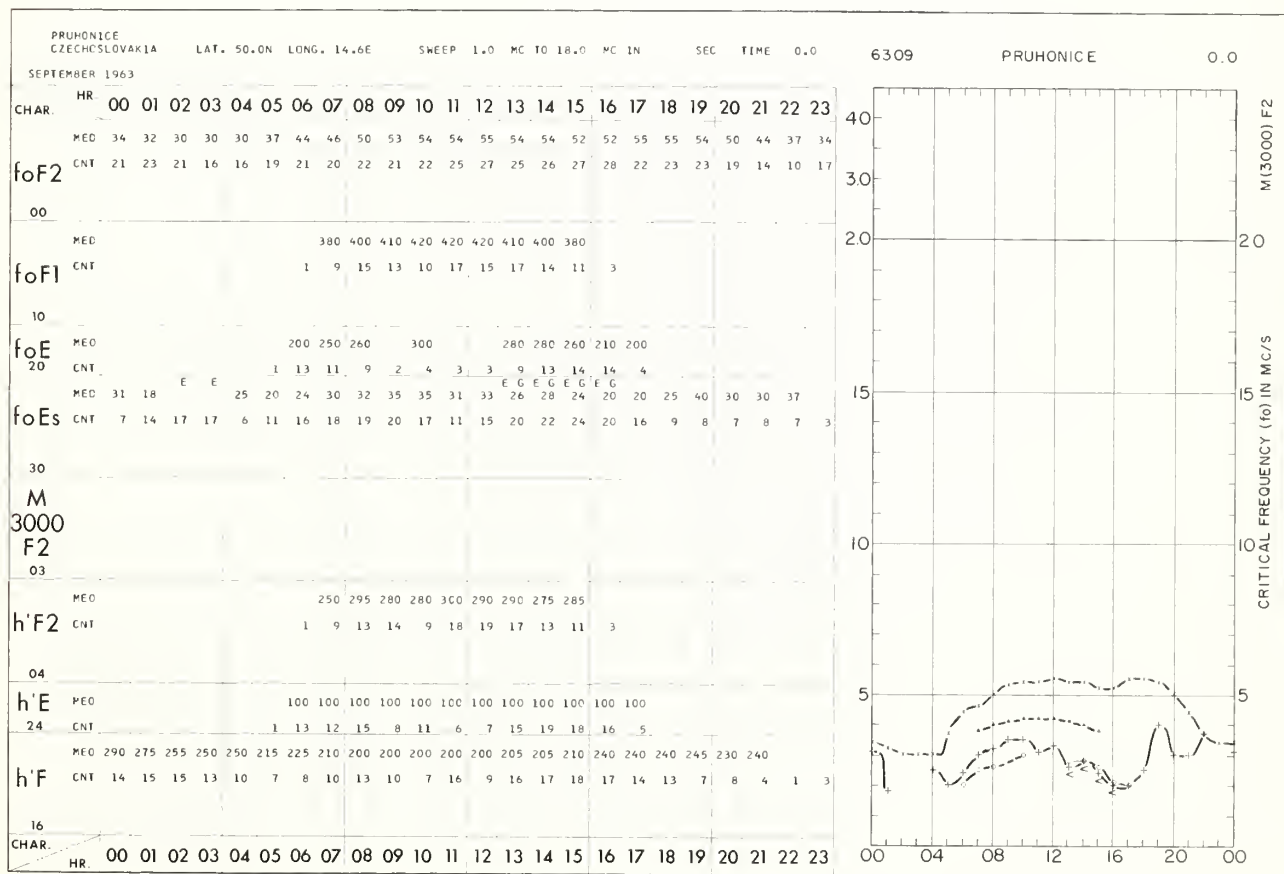
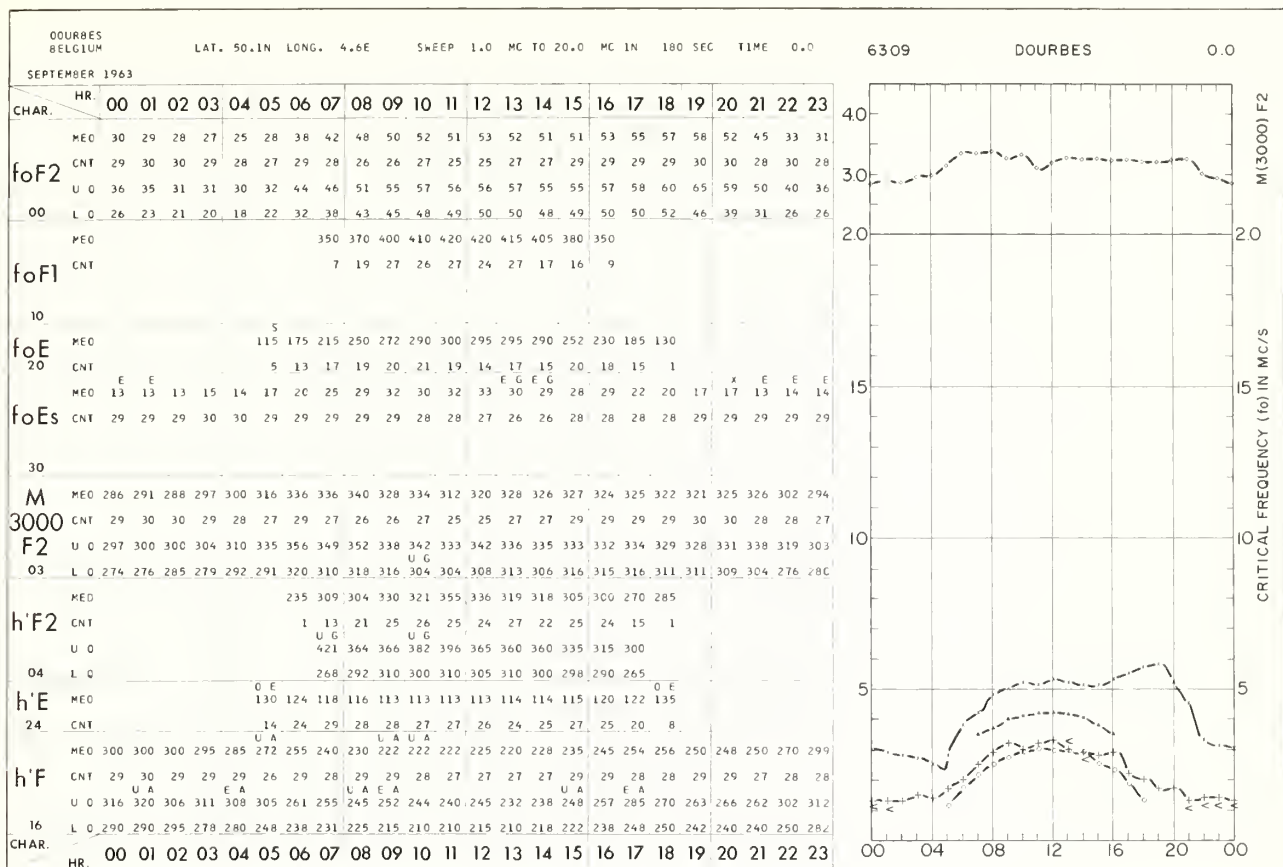


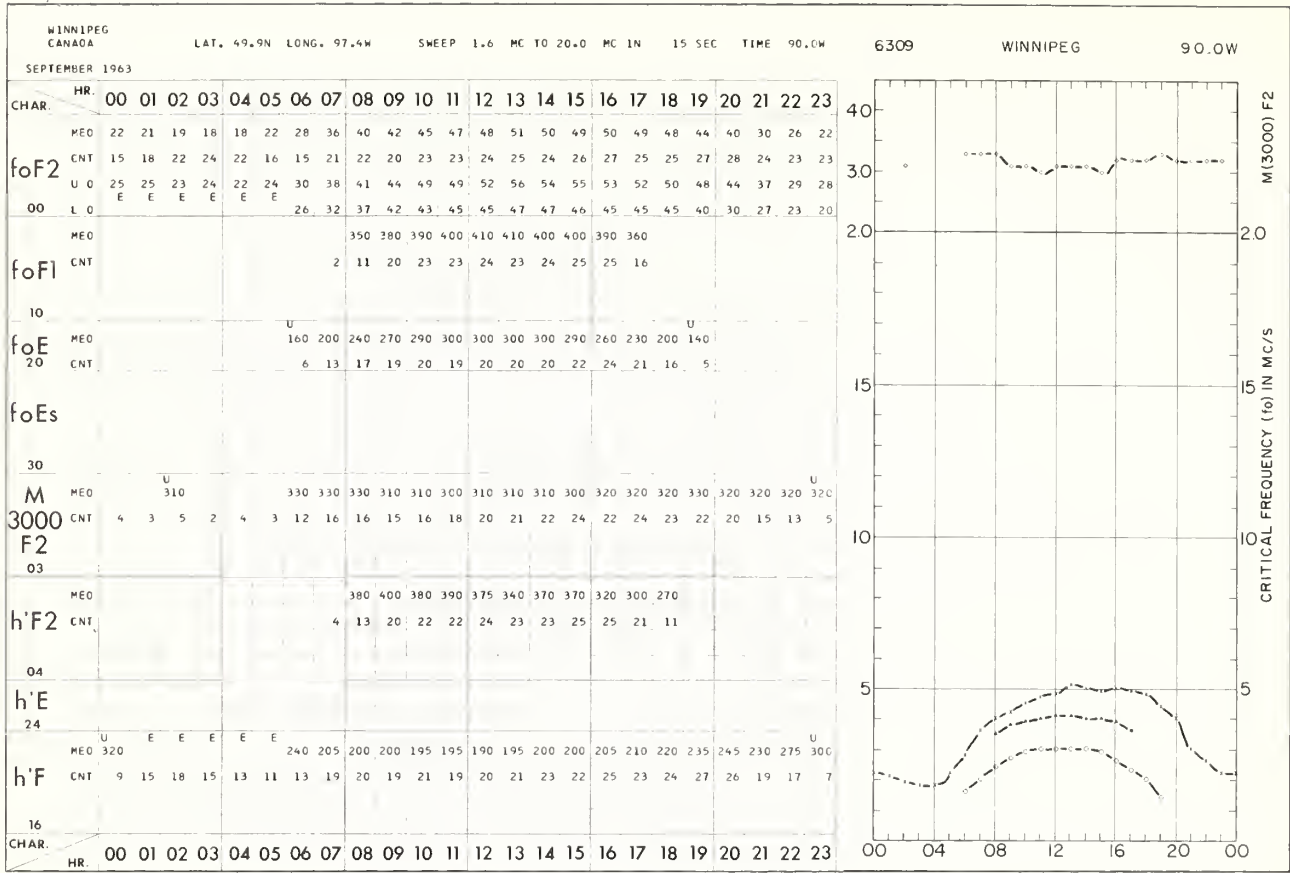












WAKKANAI  
JAPAN

LAT. 45.4N LONG. 141.7E

SWEEP 1.0 MC TO 18.0 MC IN 40 SEC TIME 135.0F

6309 WAKKANAI 135.0E

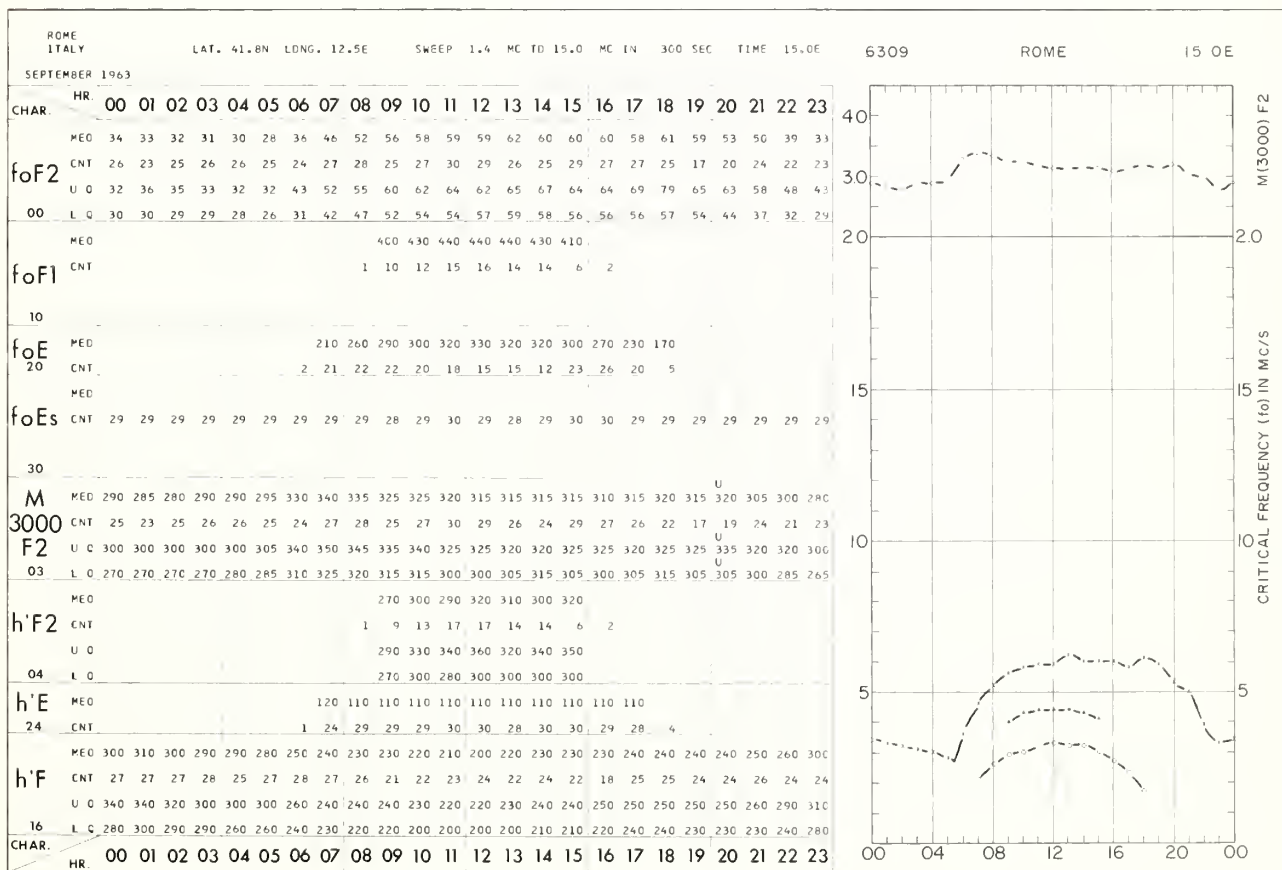
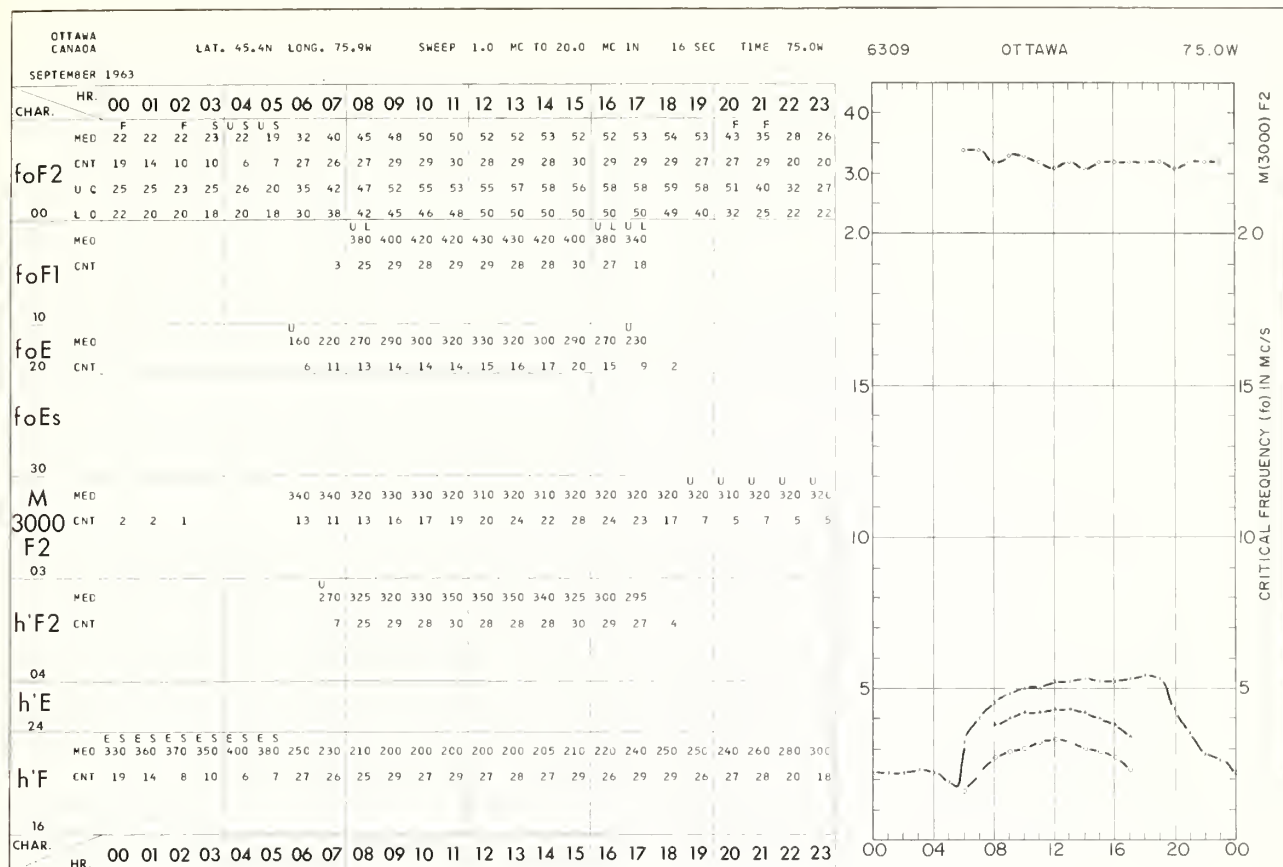
SEPTEMBER 1963

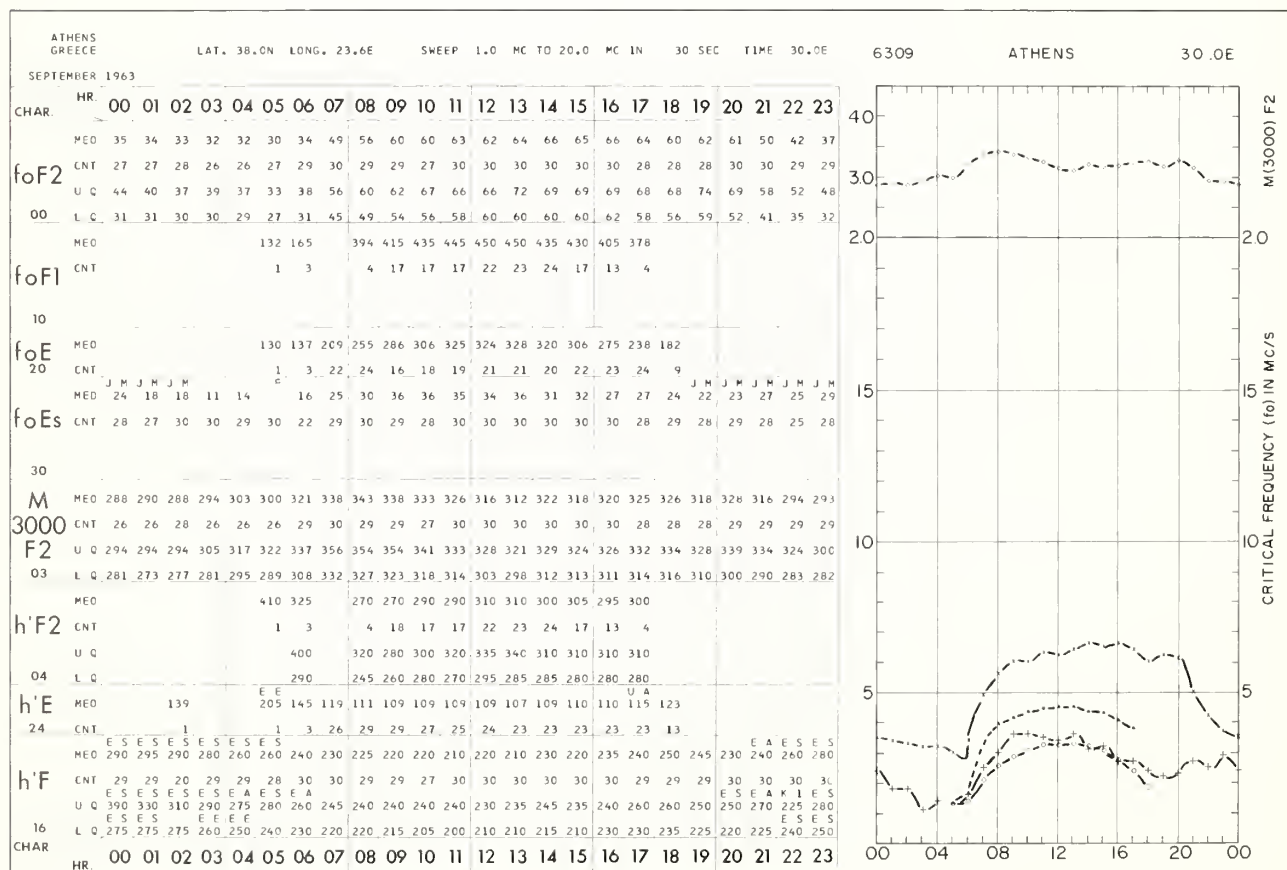
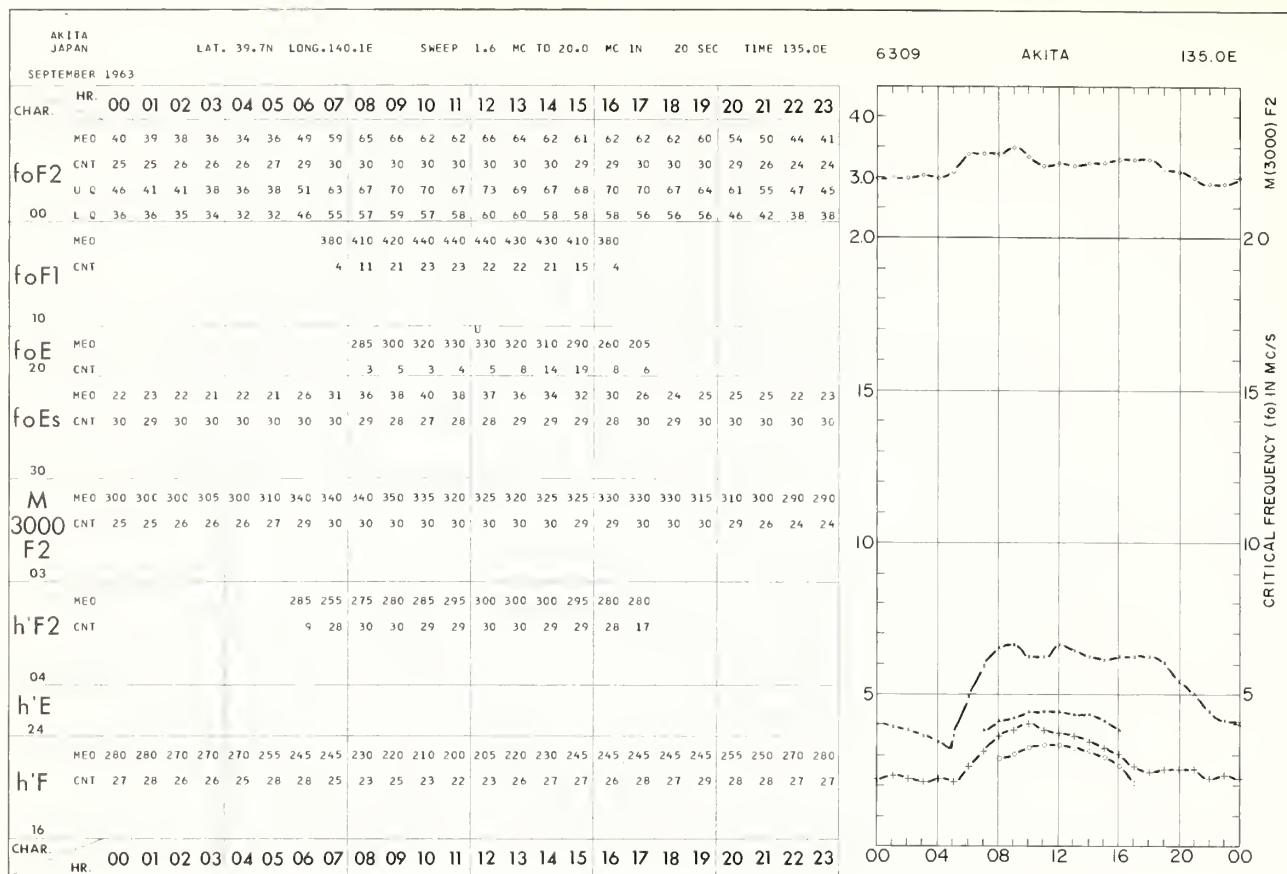
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CRITICAL FREQUENCY (fo) IN MC/S

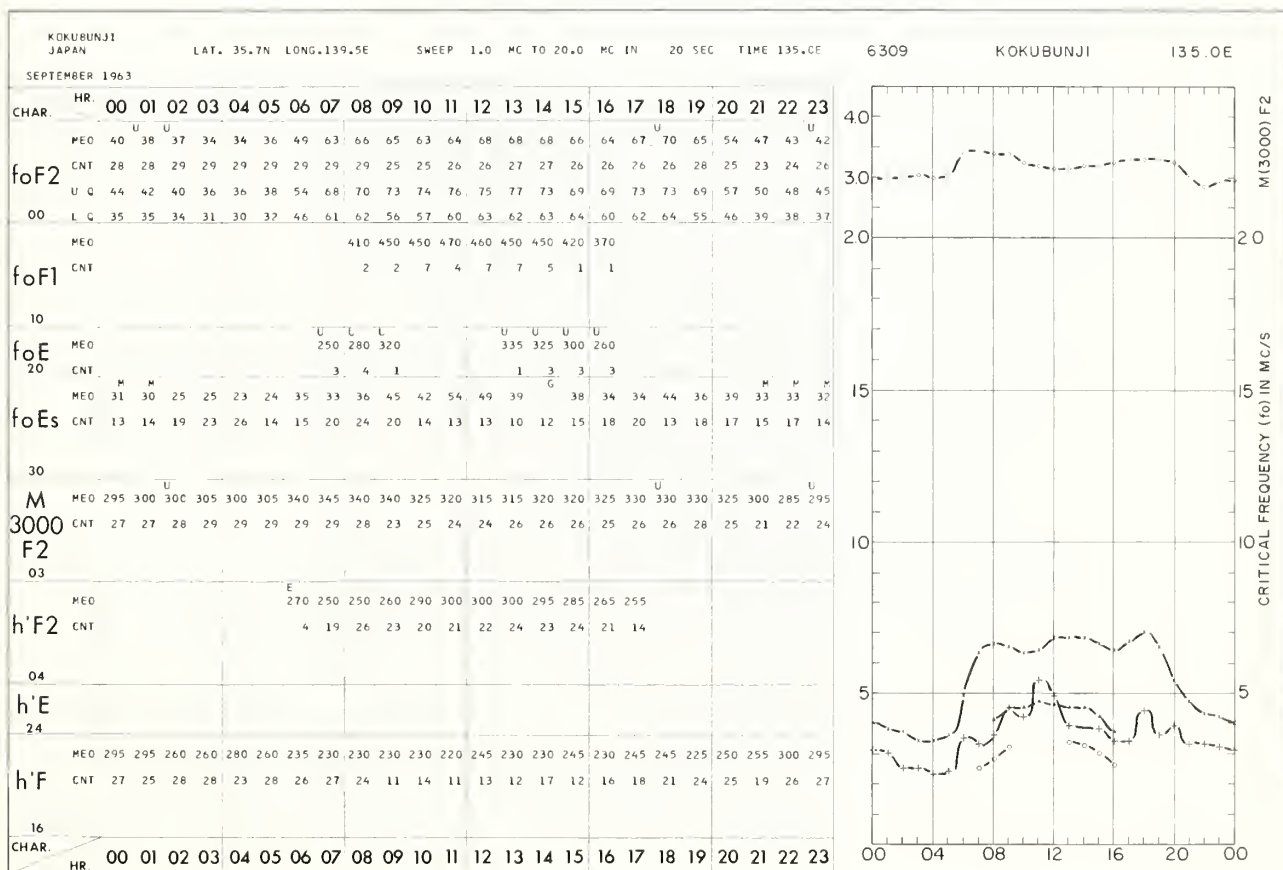
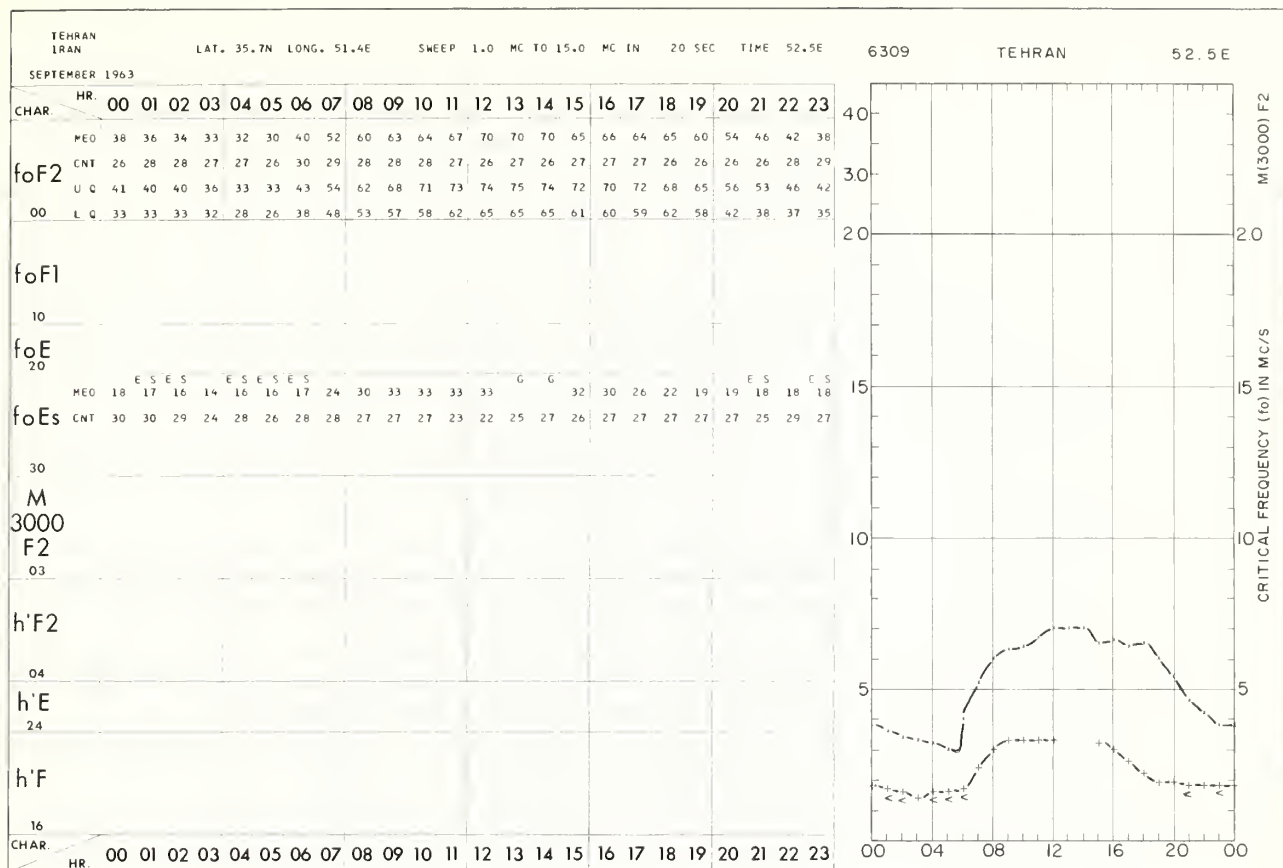
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M (3000) F2

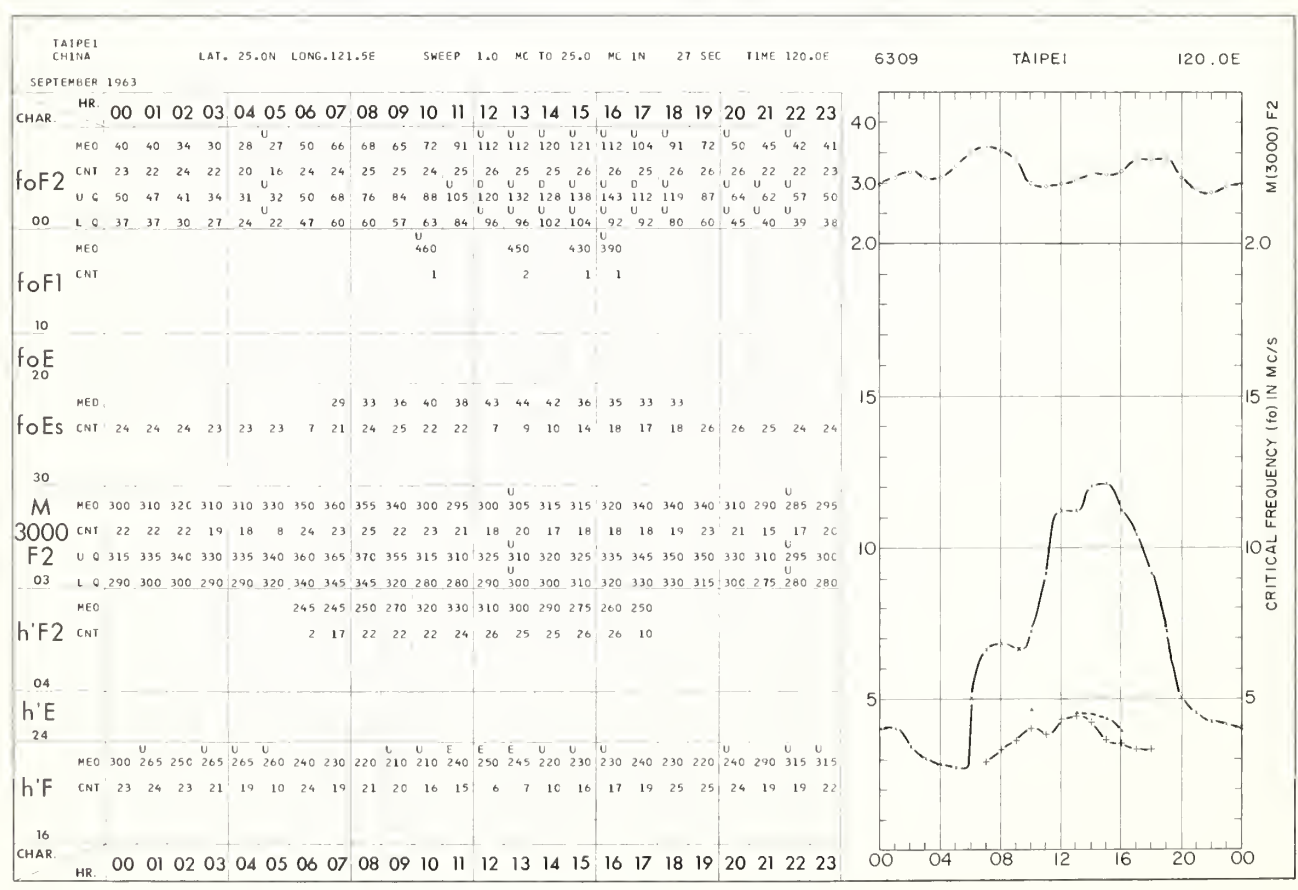
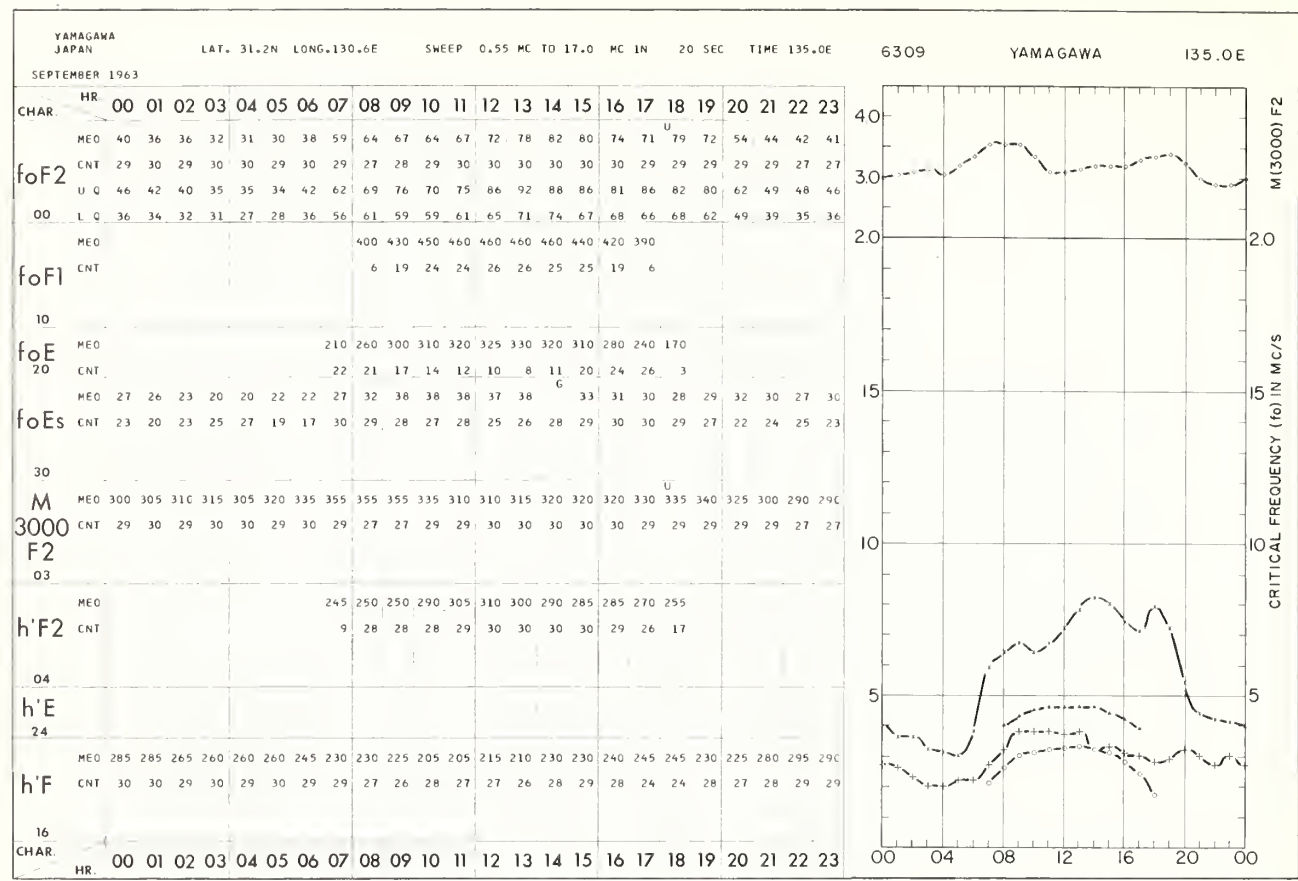


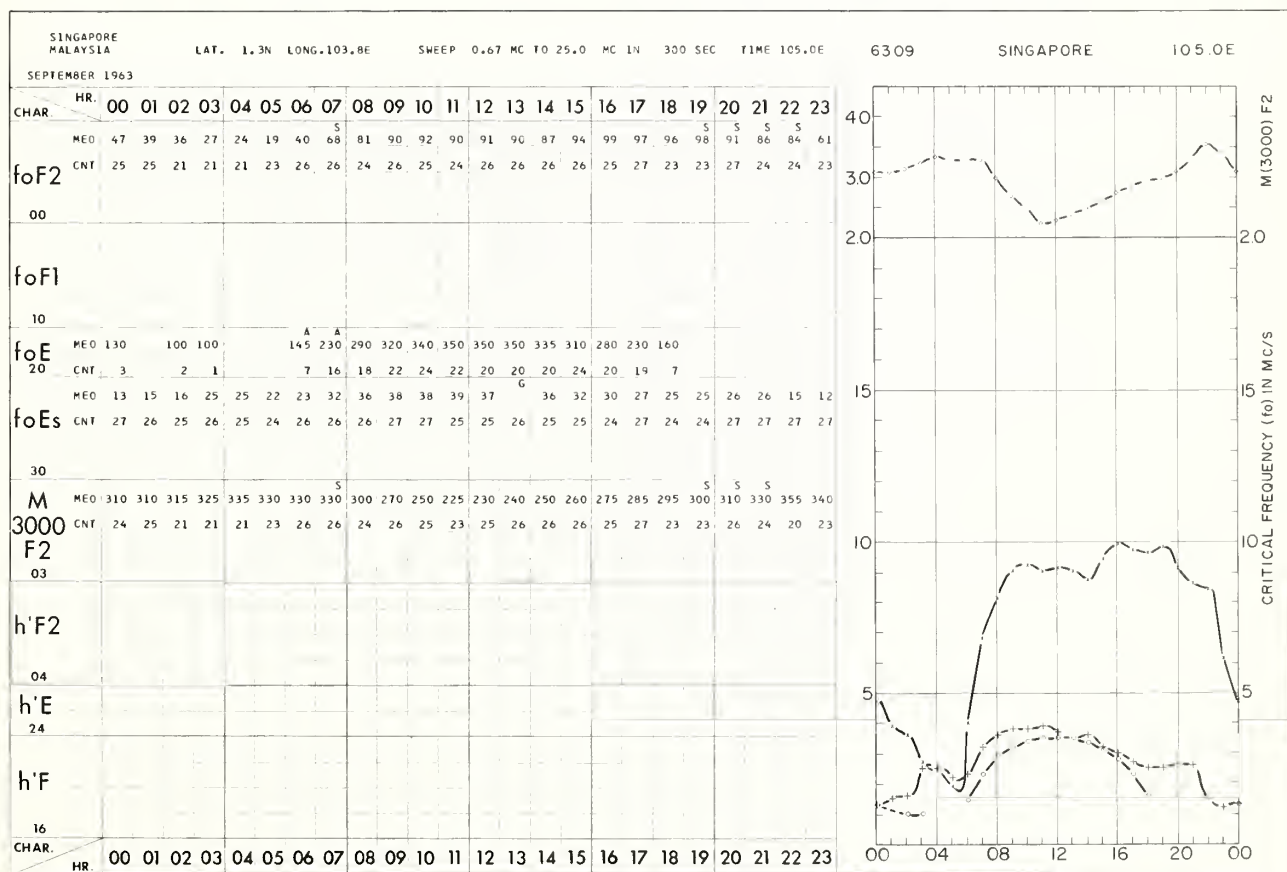
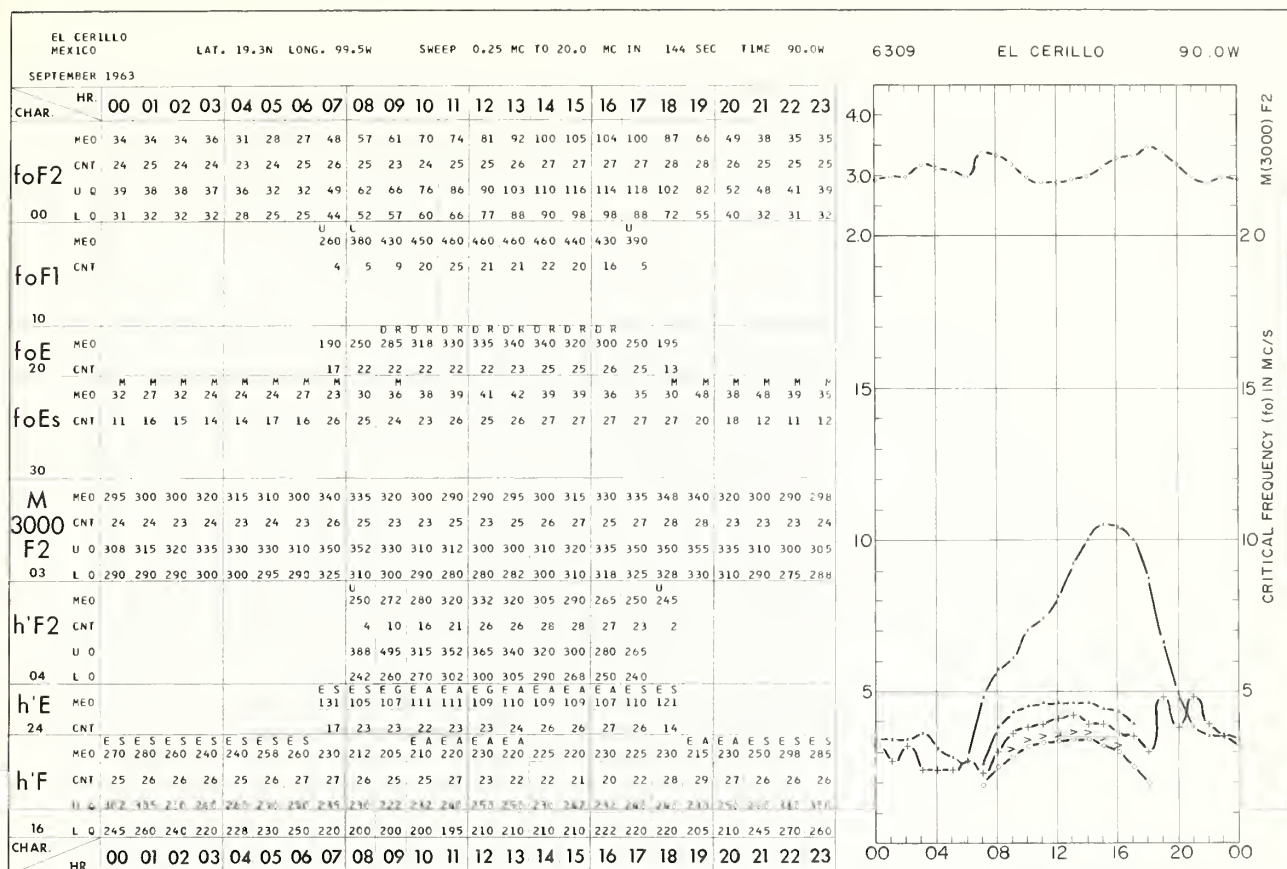


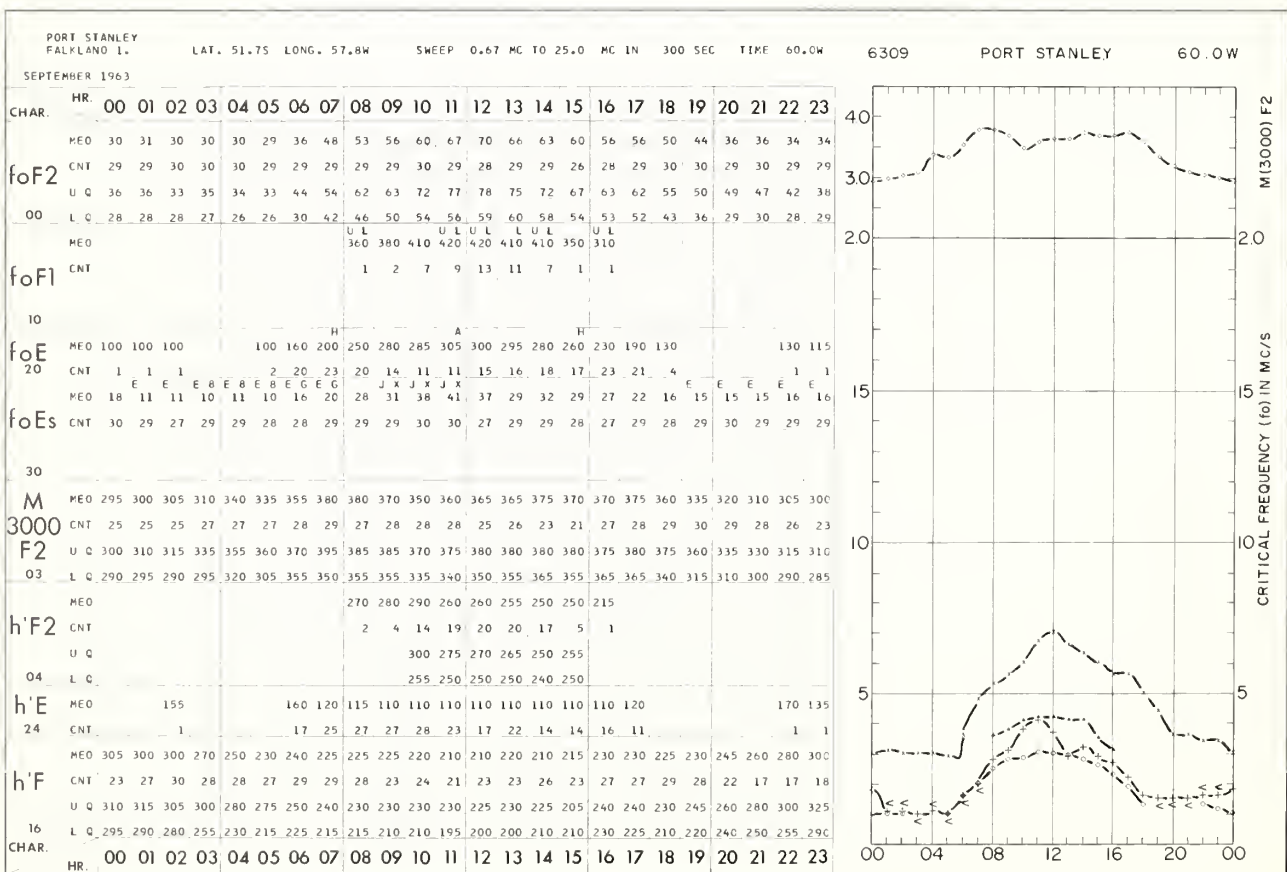
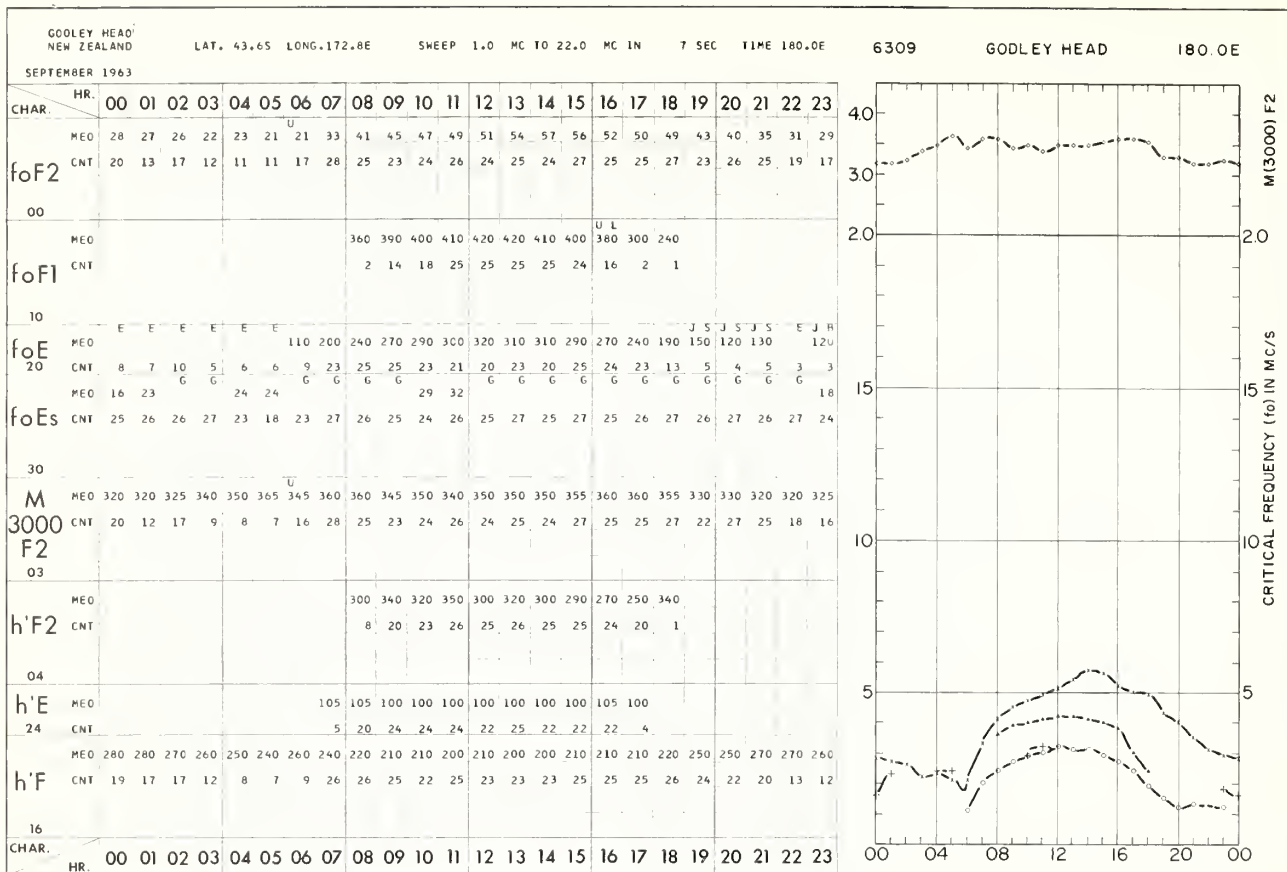


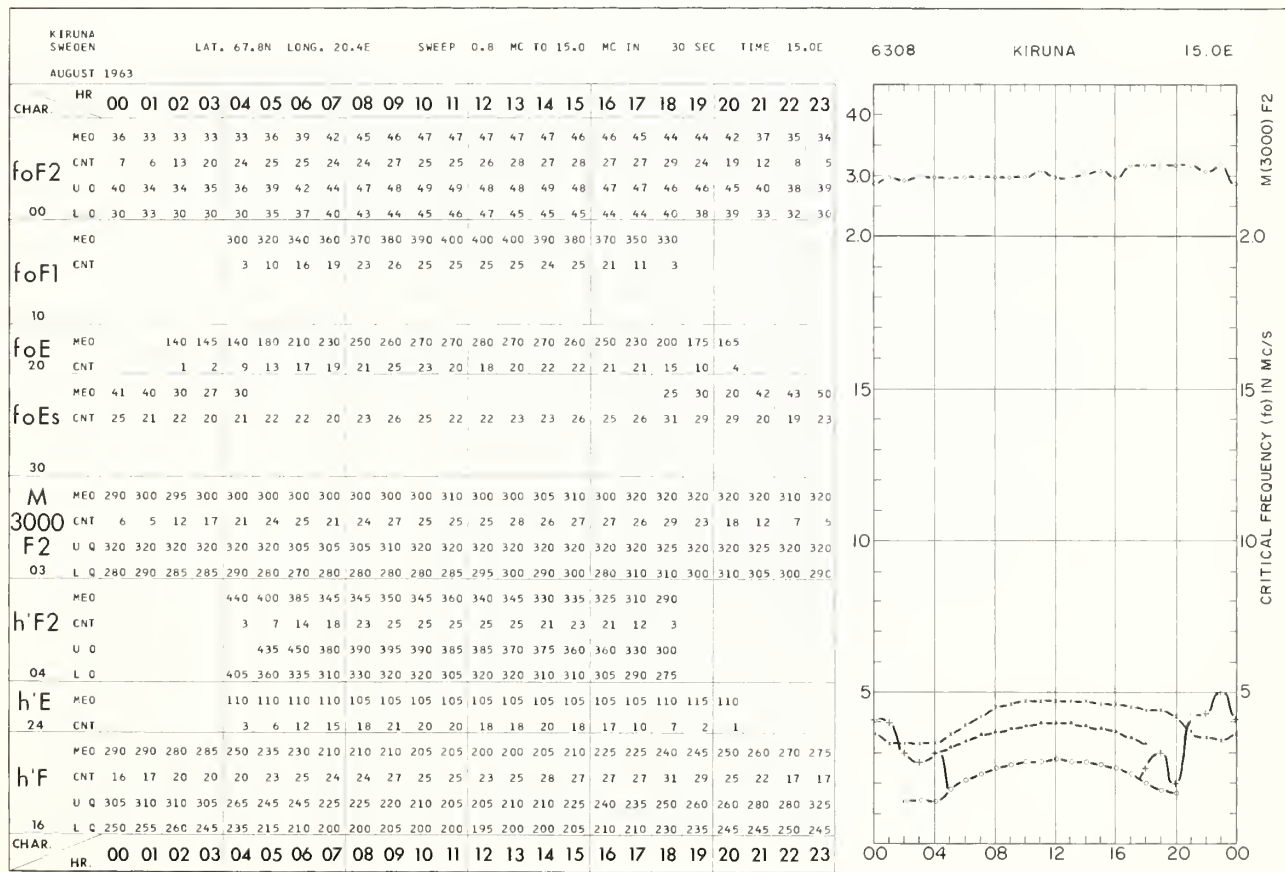
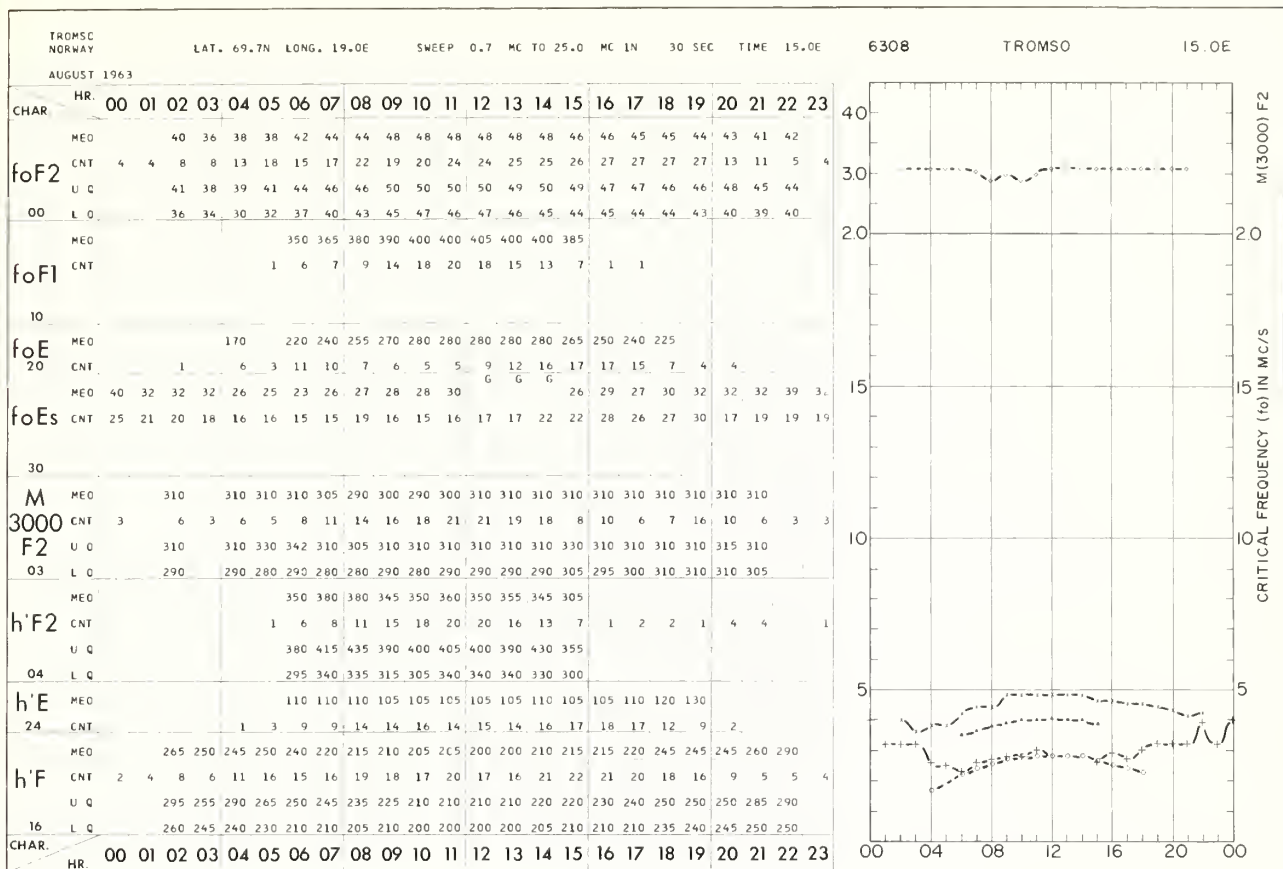




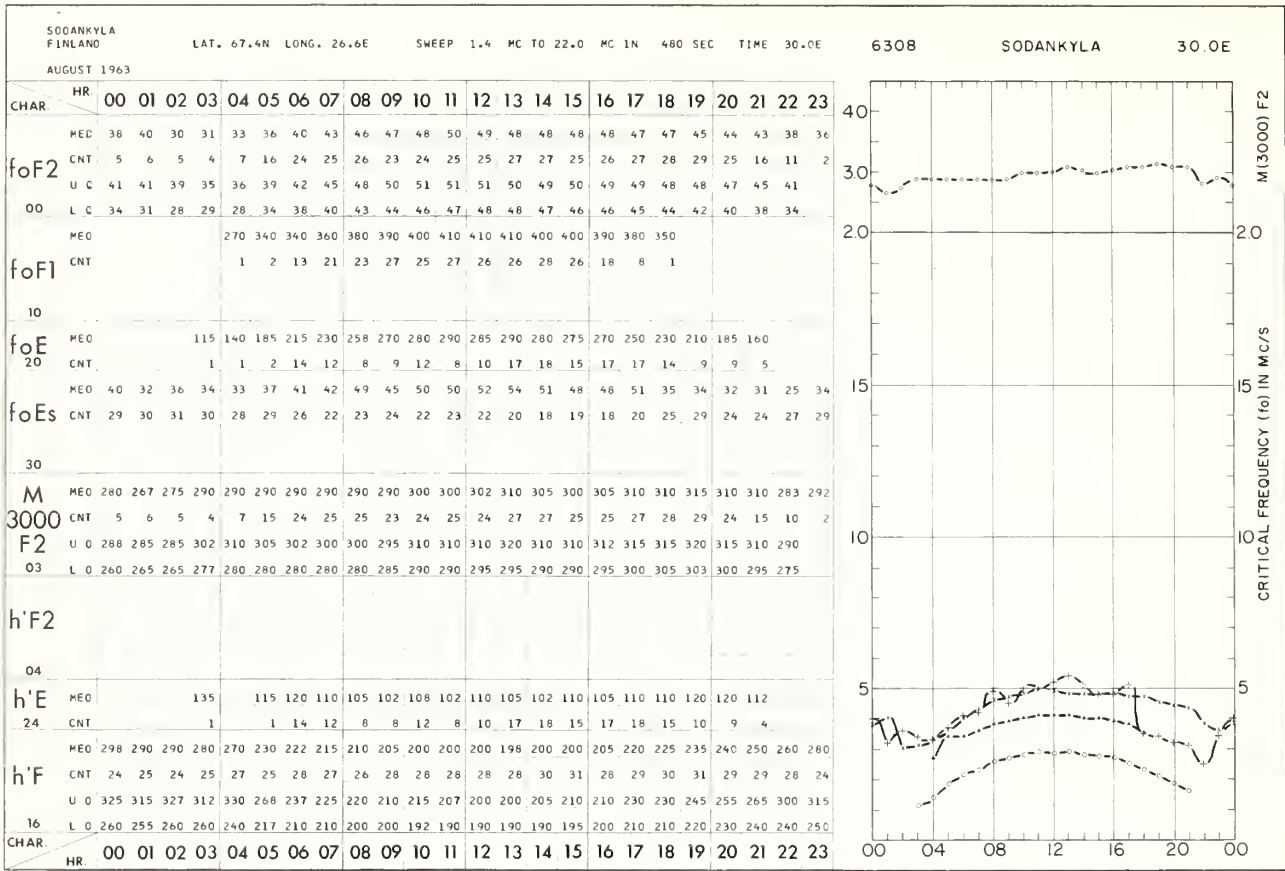












LYCKSELE  
SWEDEN

AUGUST 1963

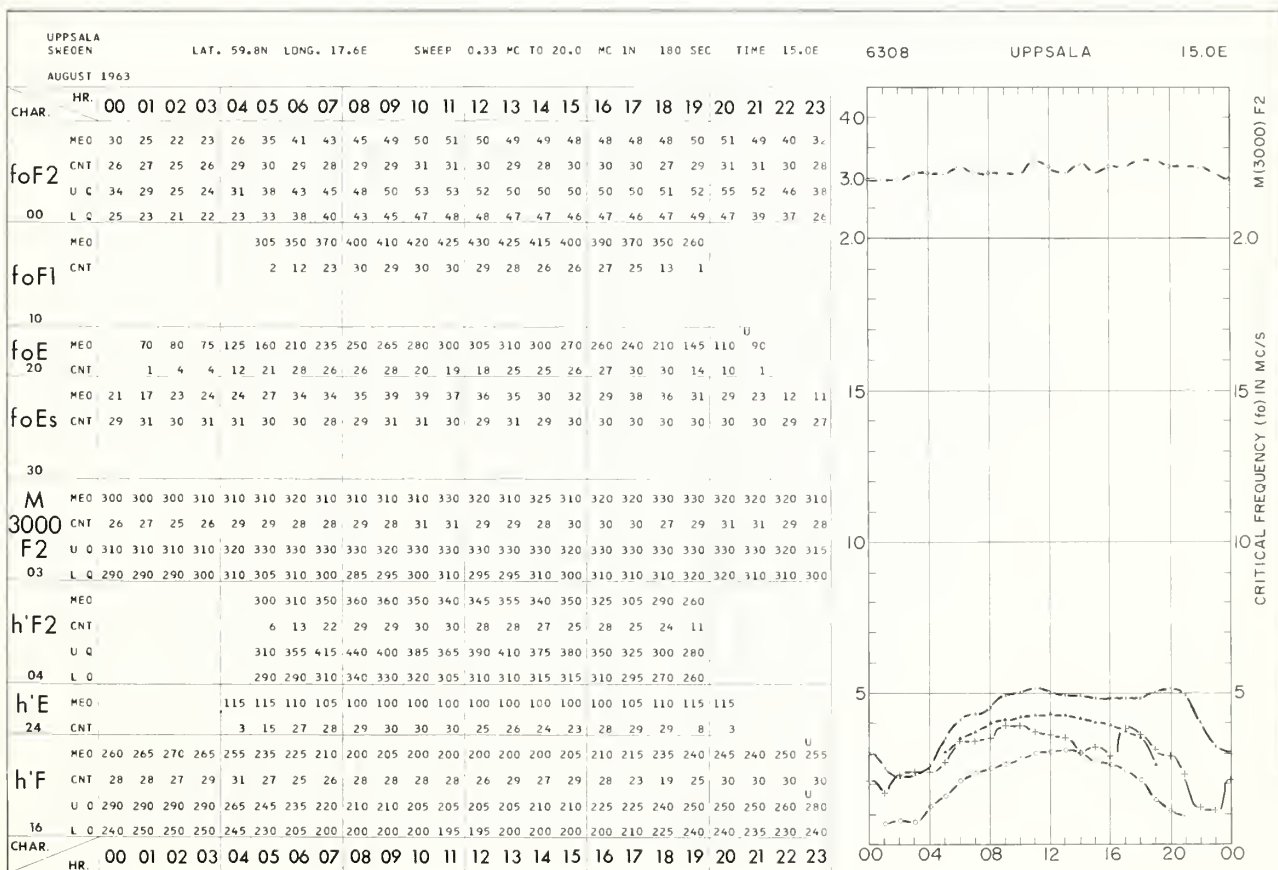
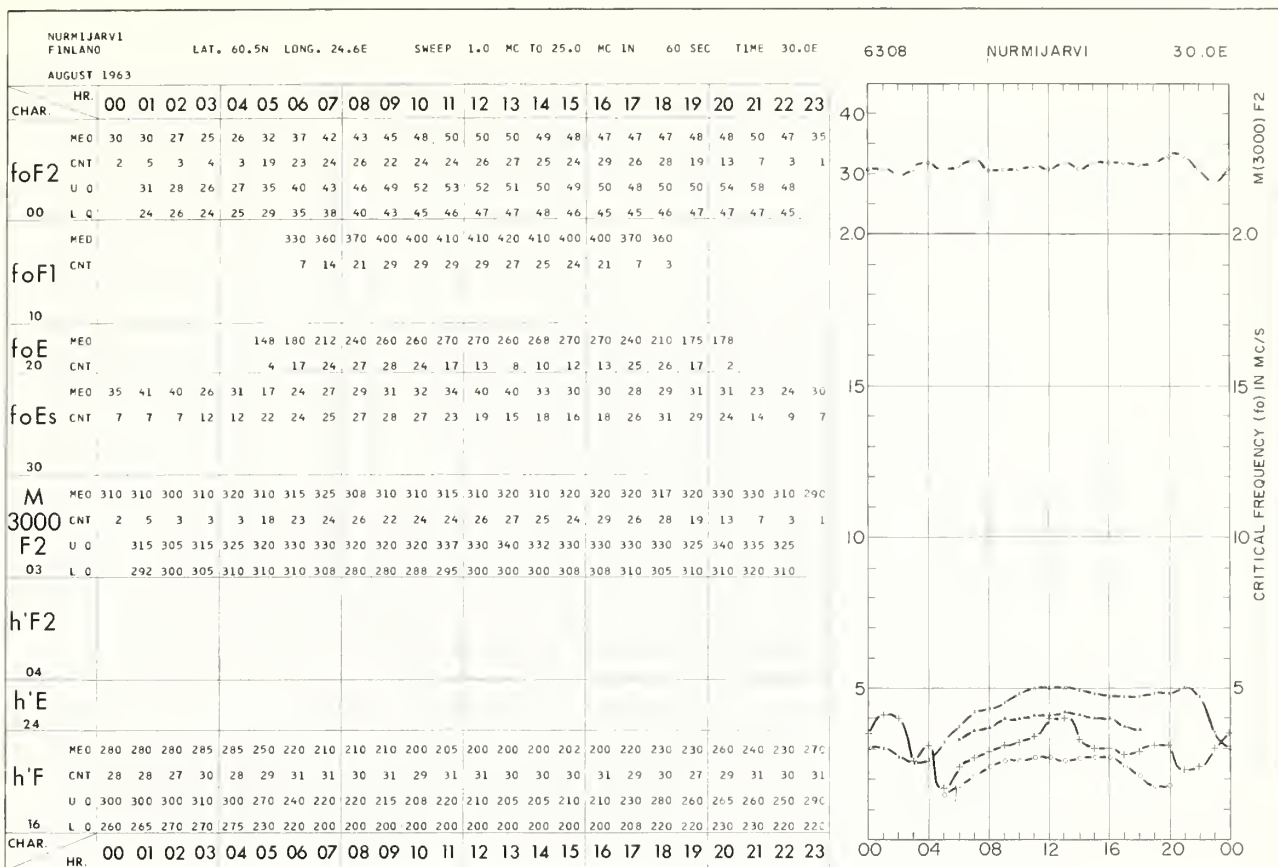
LAT. 64.7N LONG. 18.8E

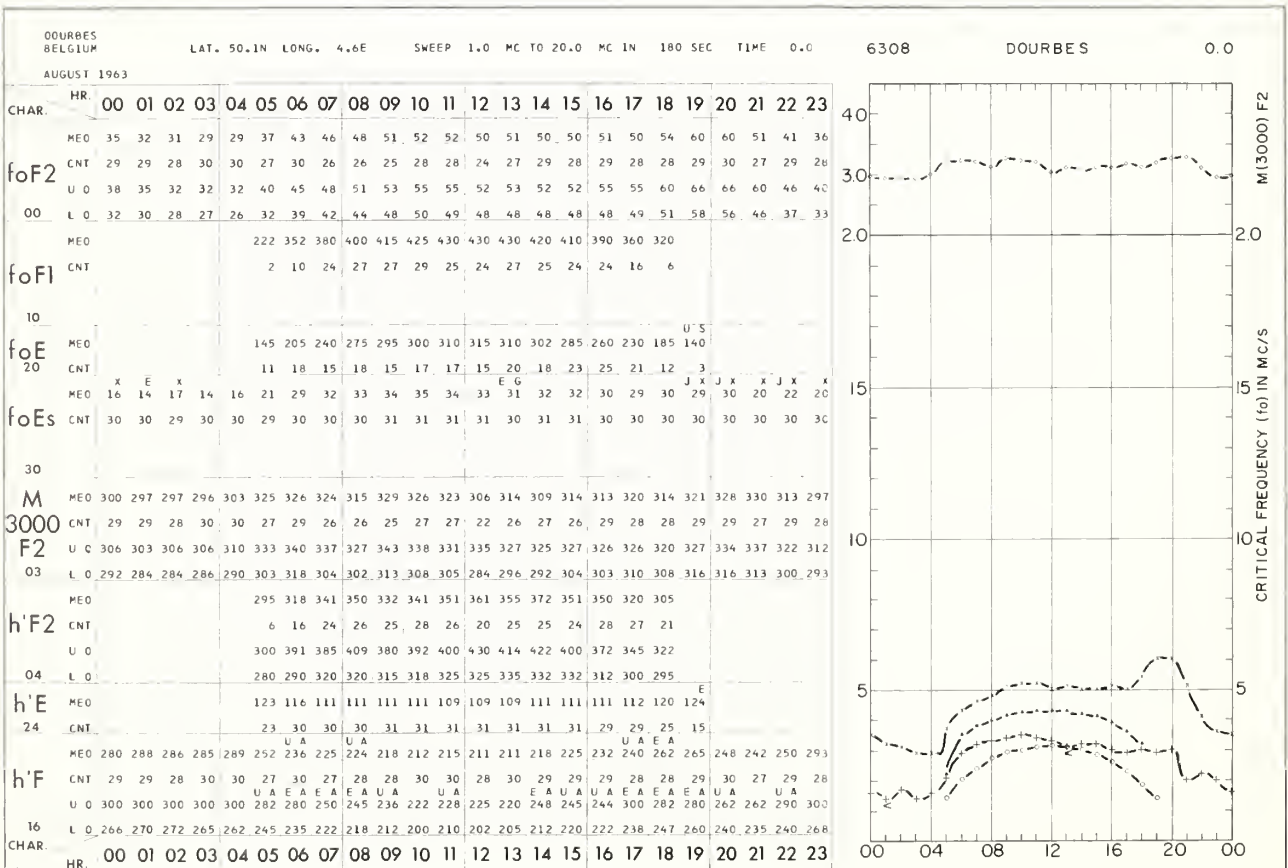
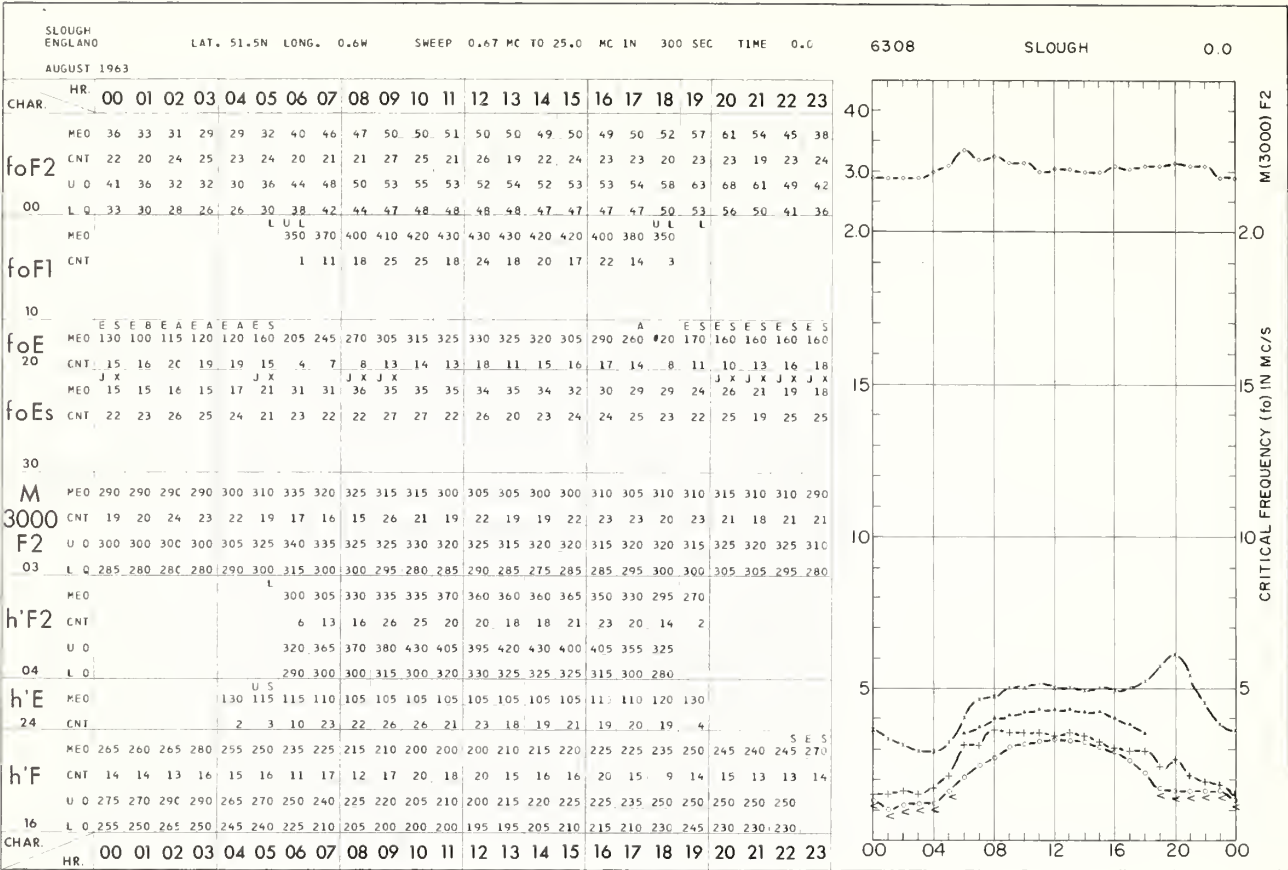
SWEEP 0.33 MC TO 20.0 MC IN 180 SEC

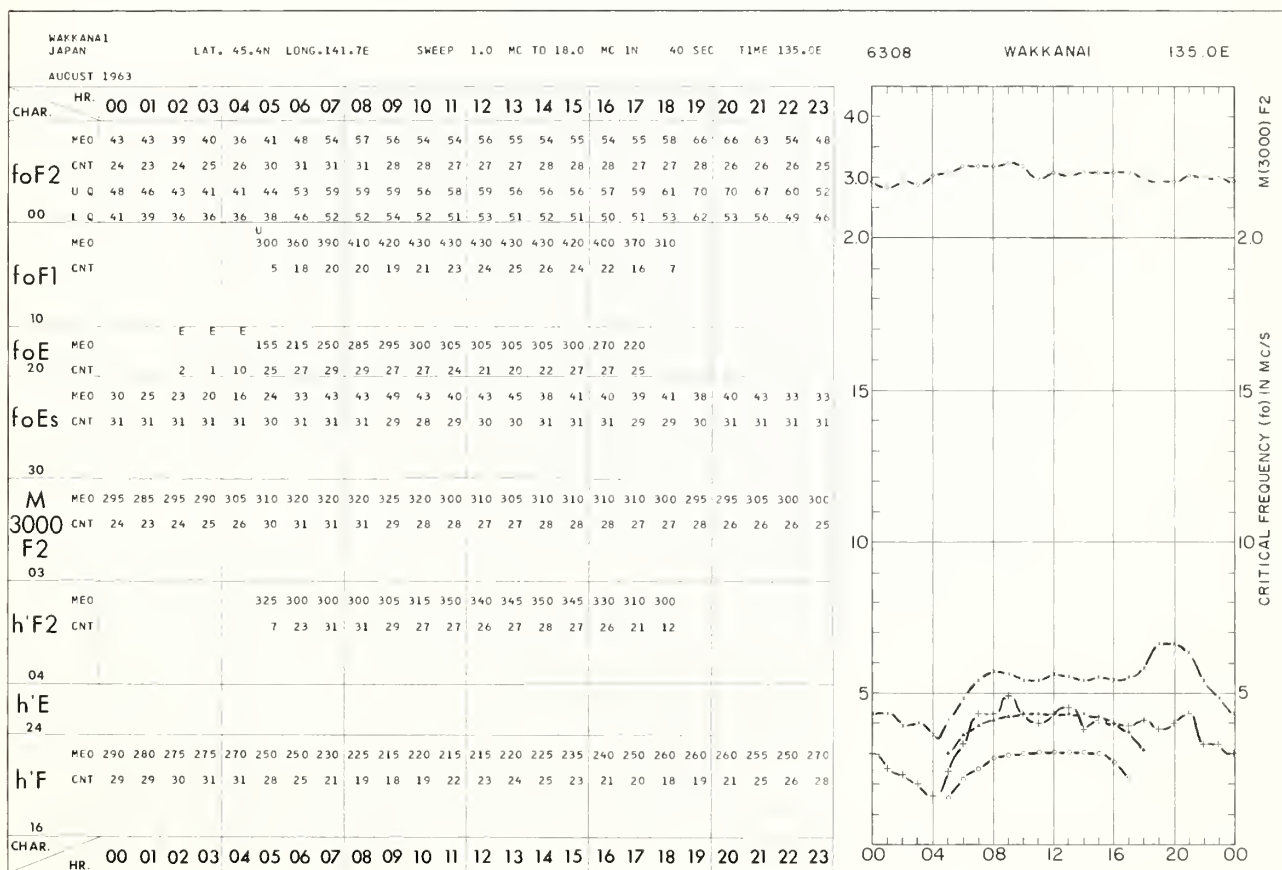
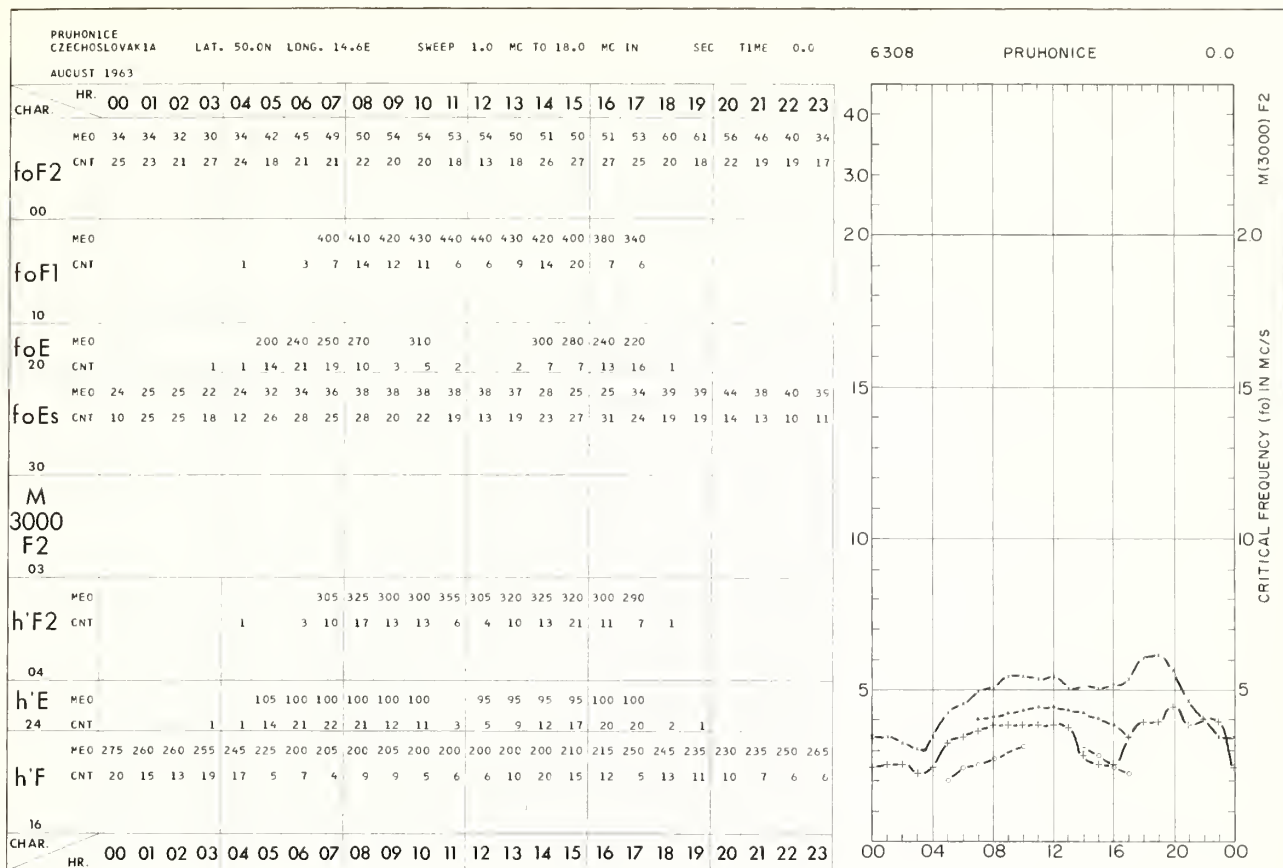
TIME 15.0E

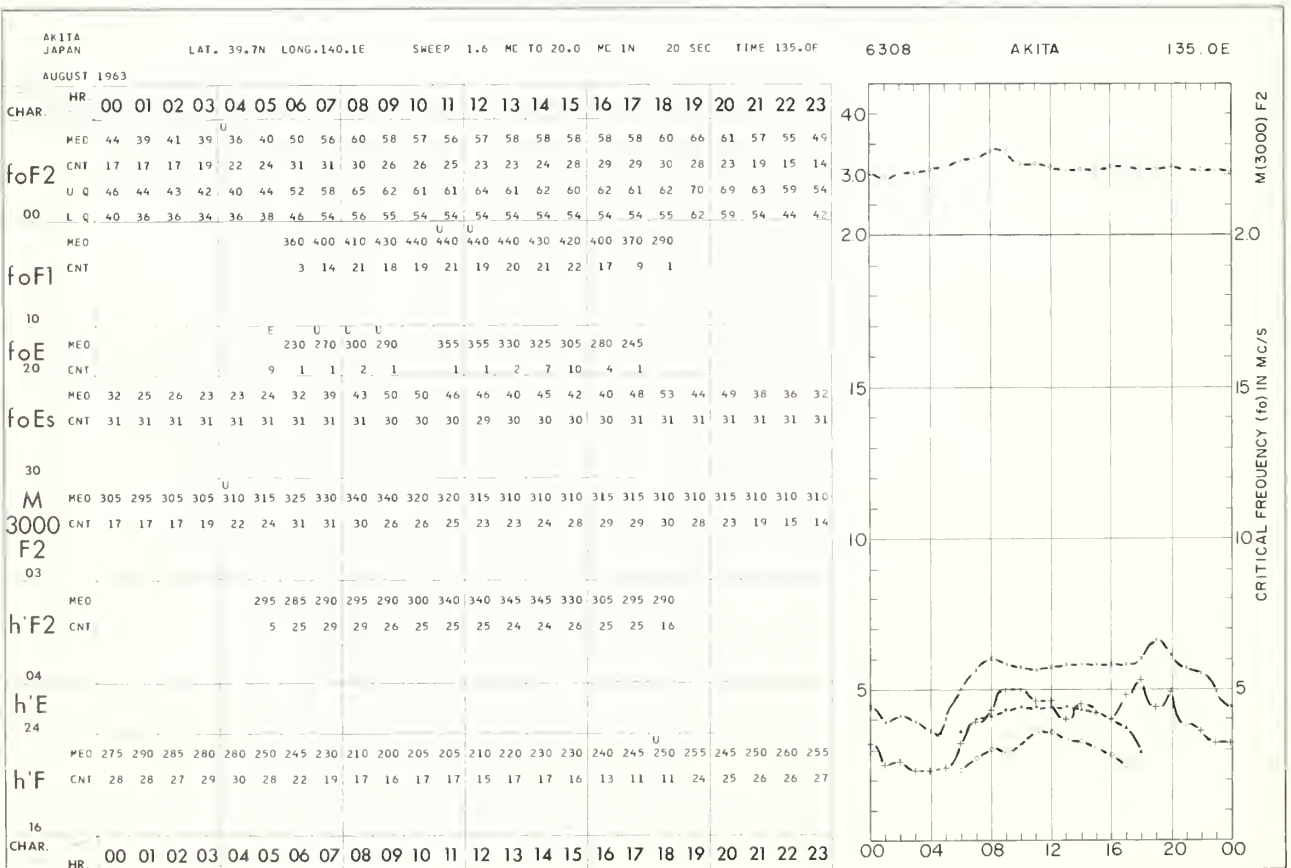
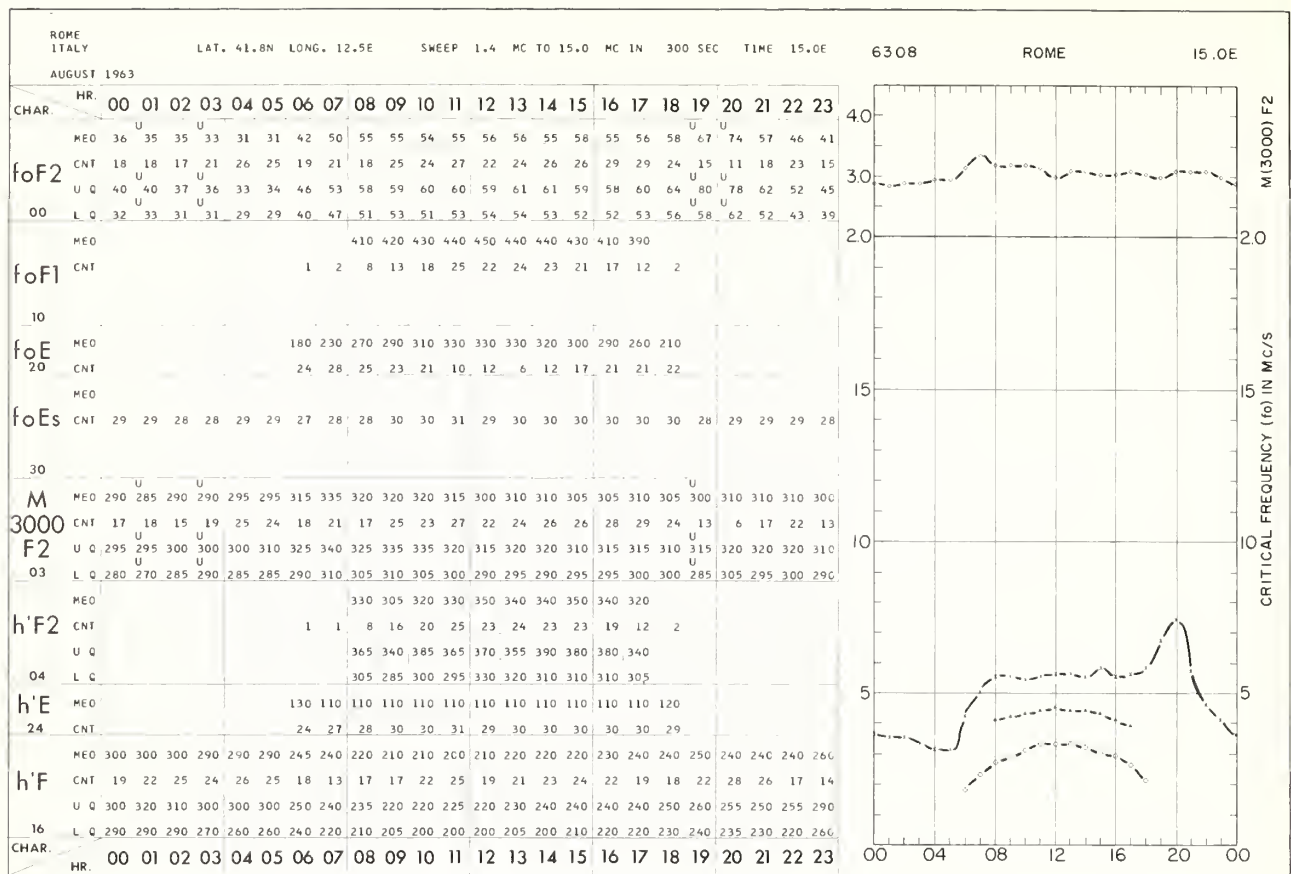
6308 LYCKSELE 15.0E



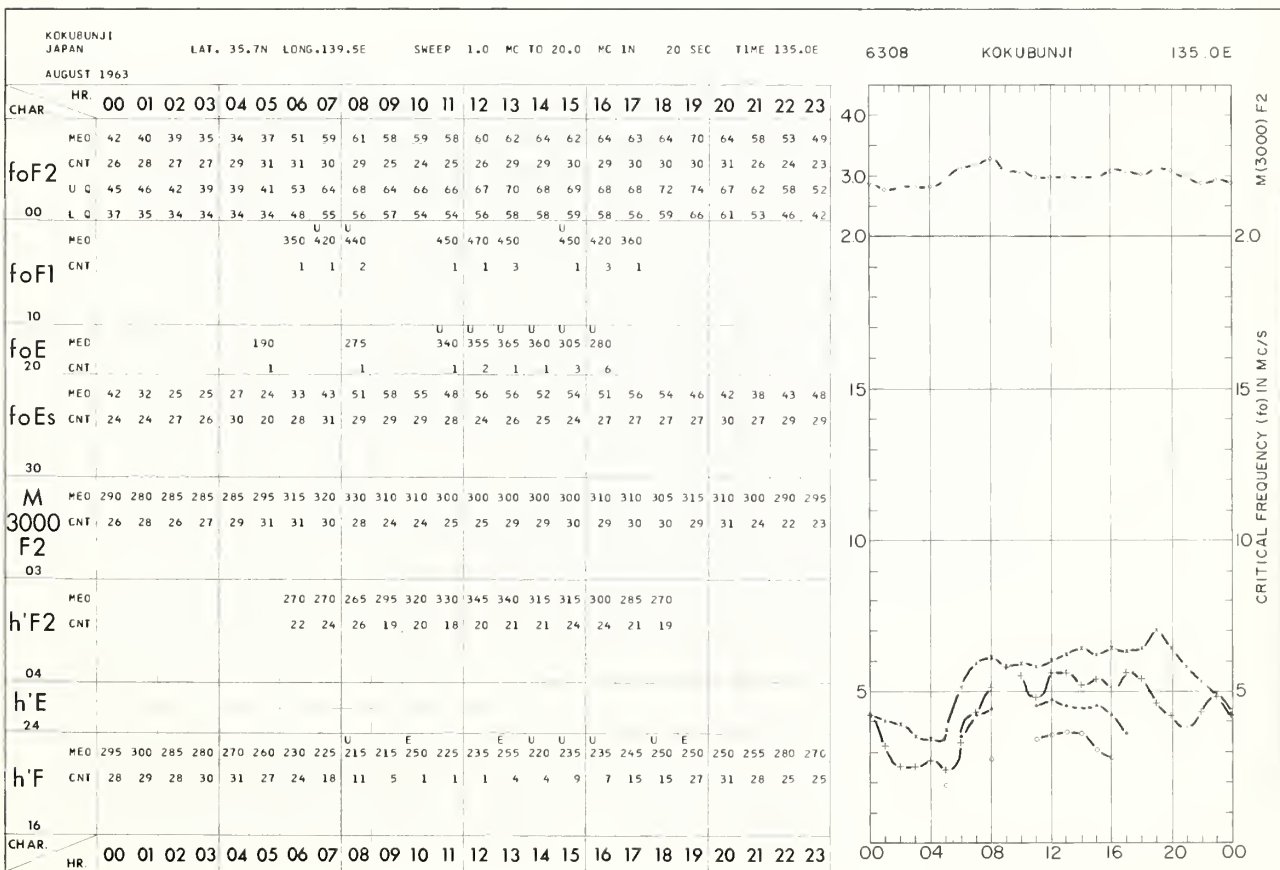
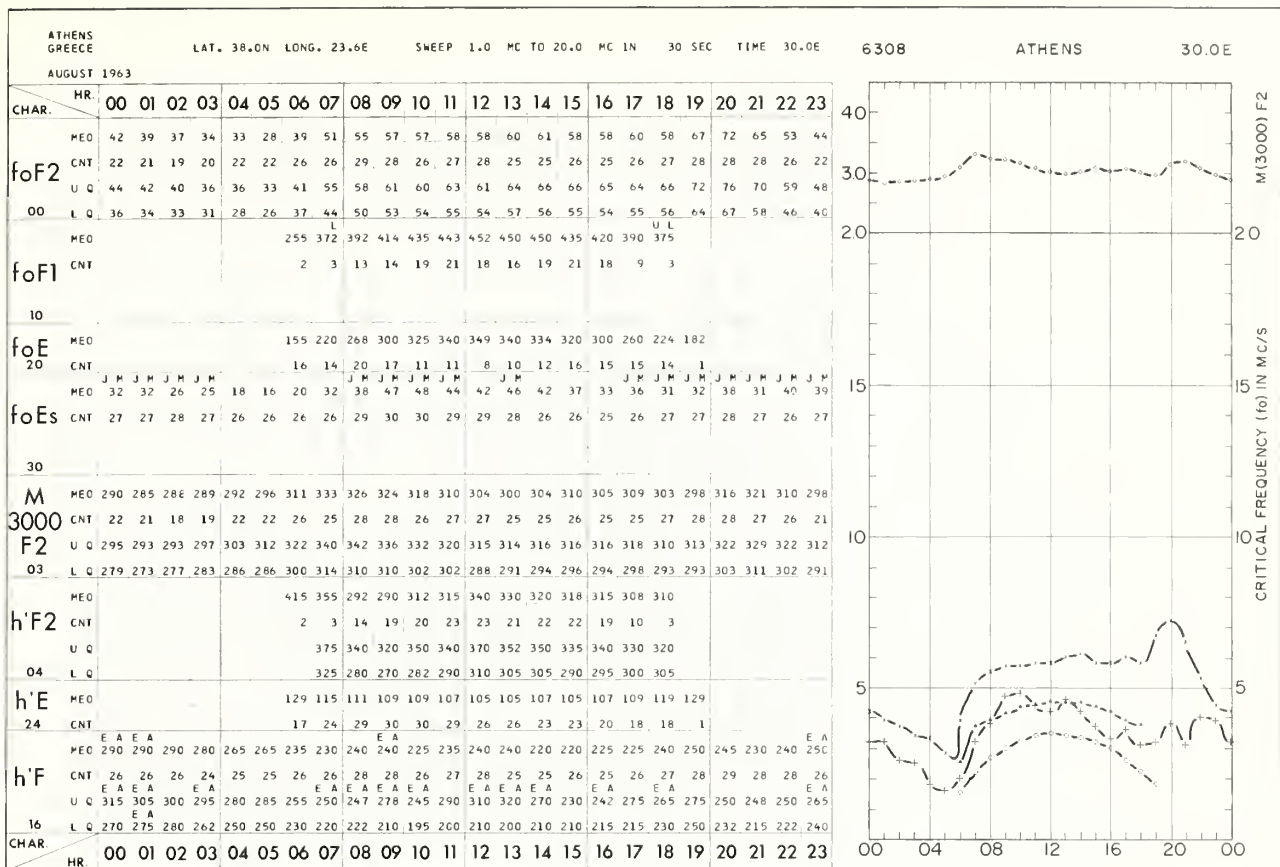




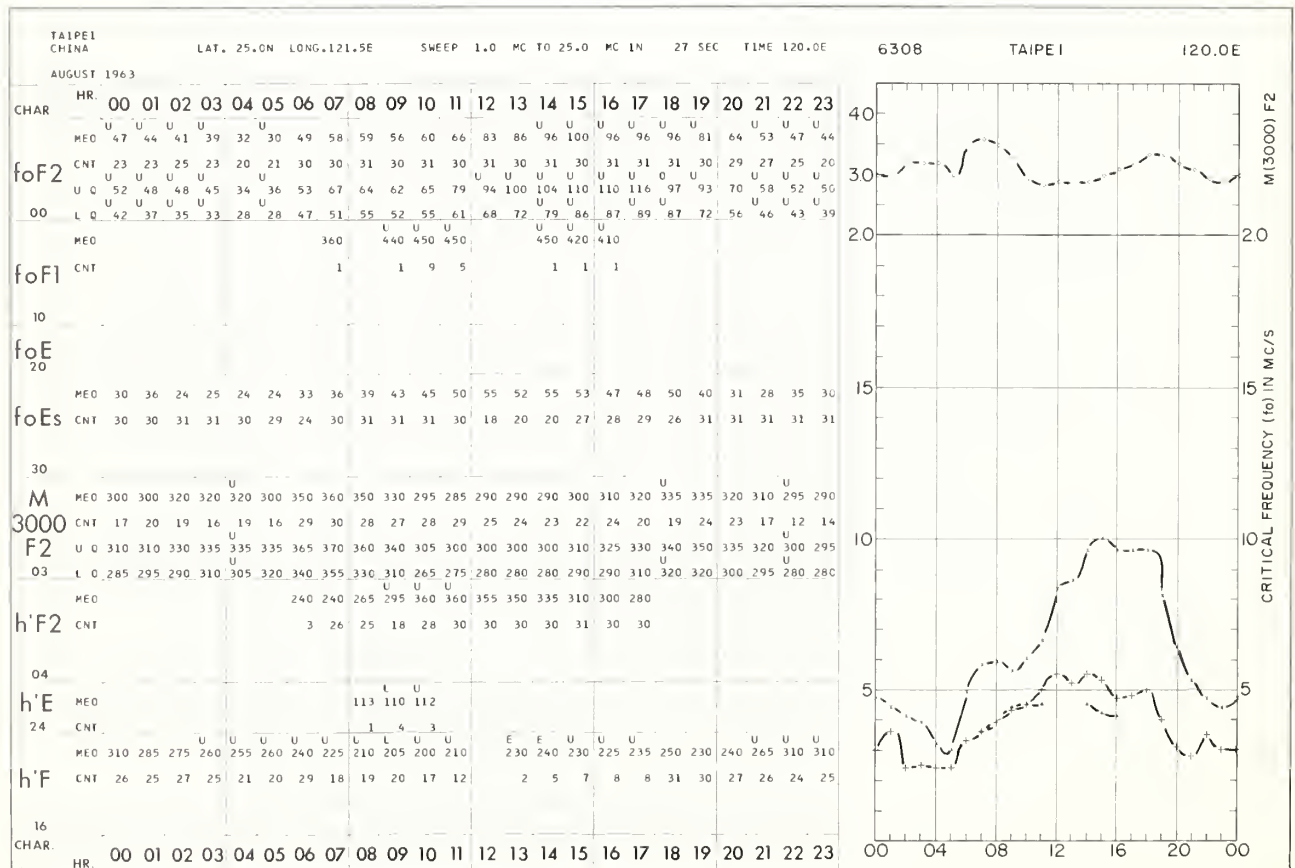
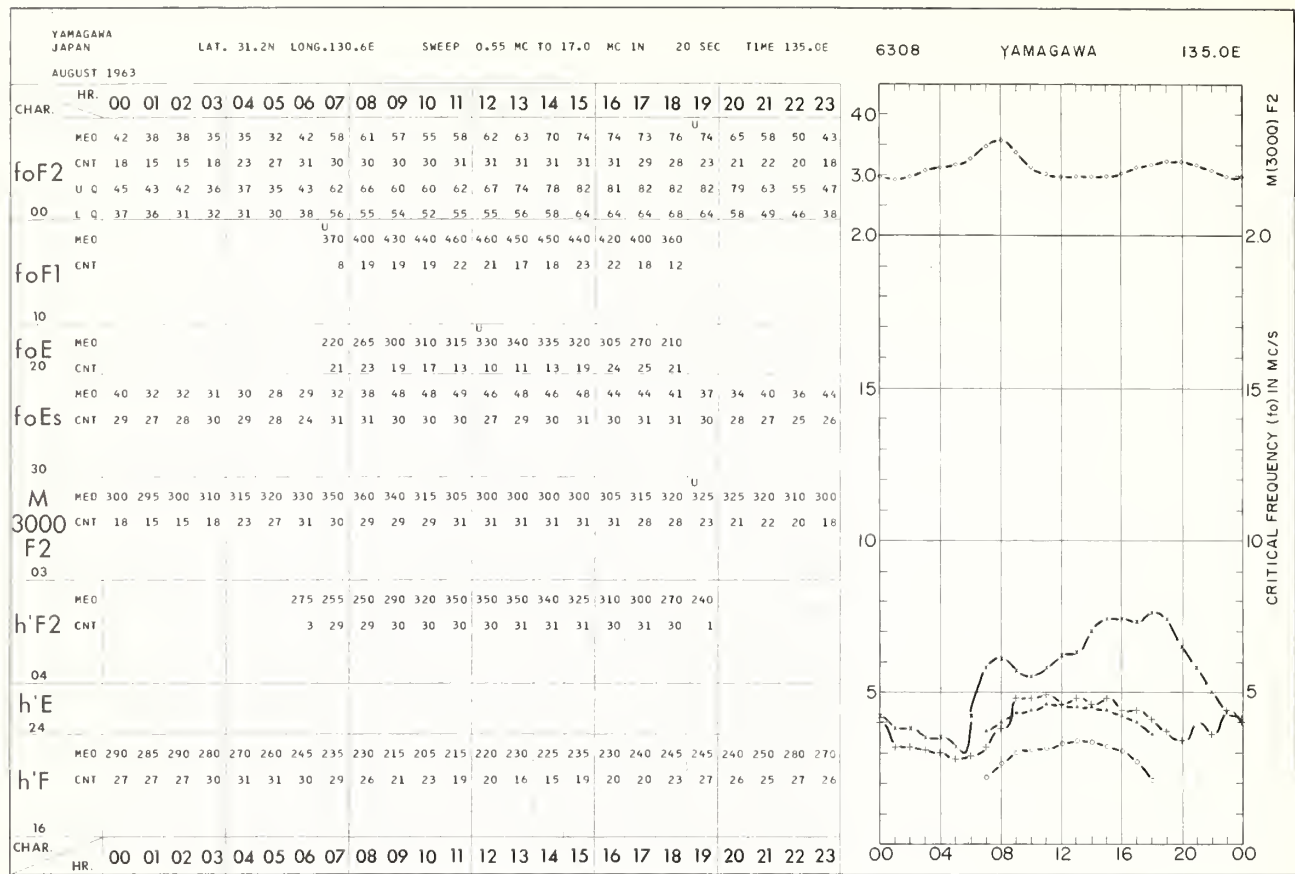


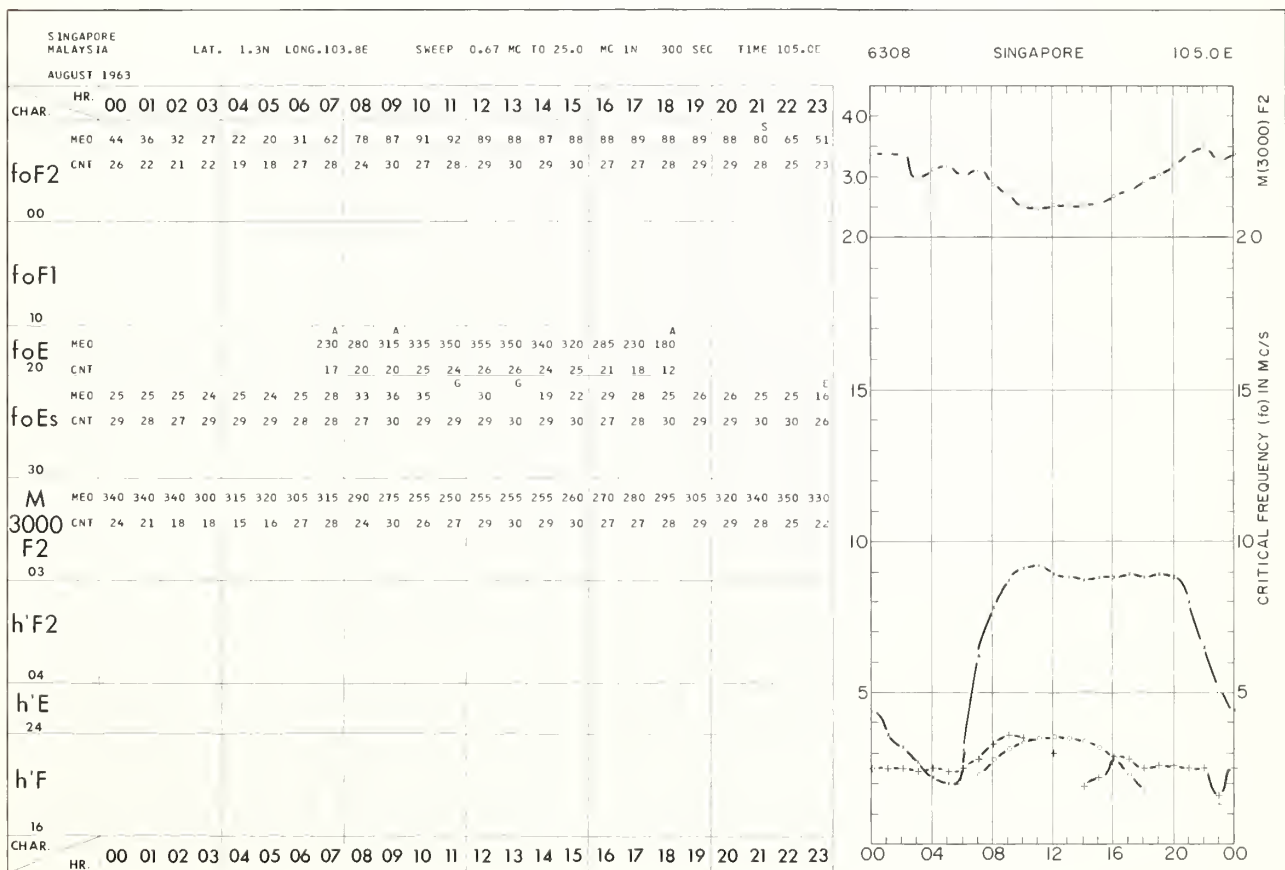
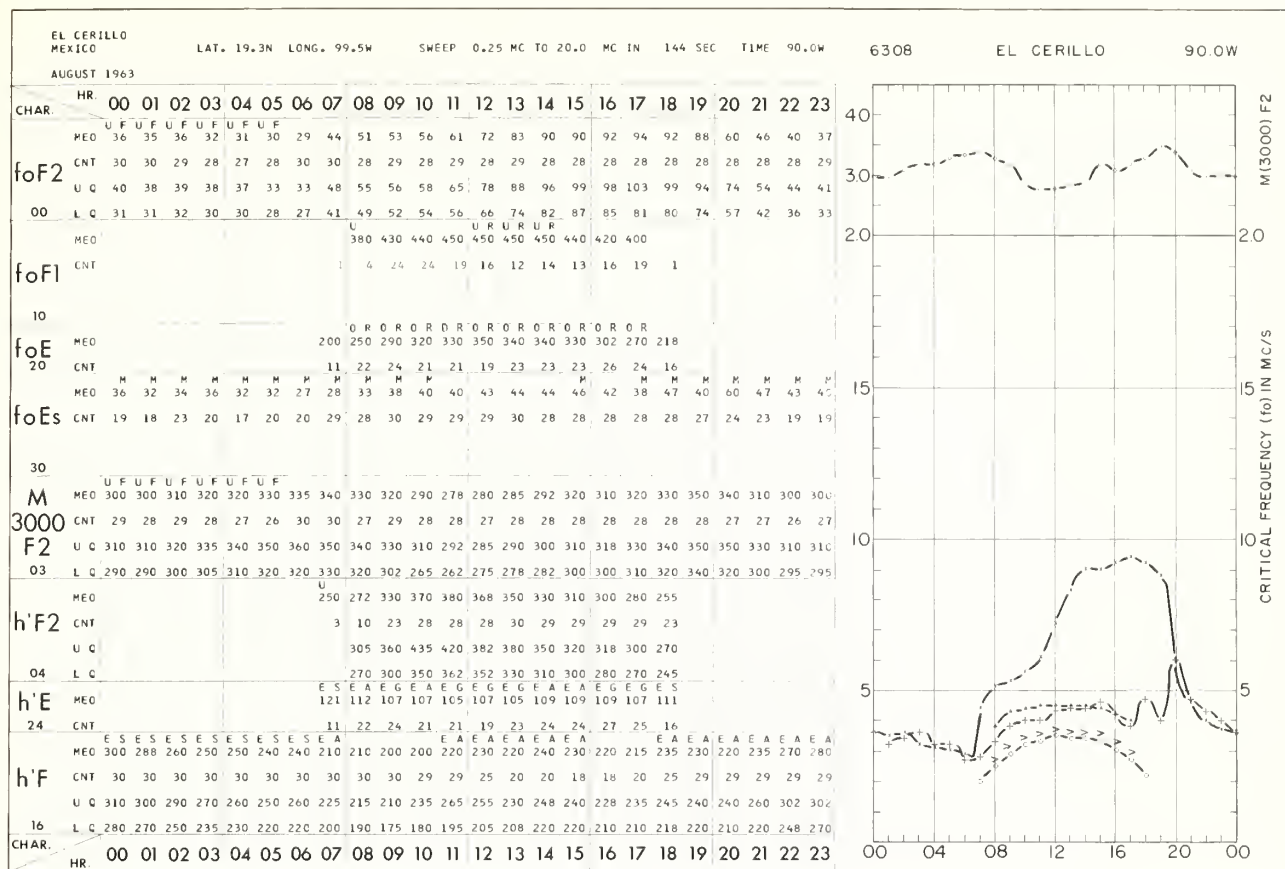


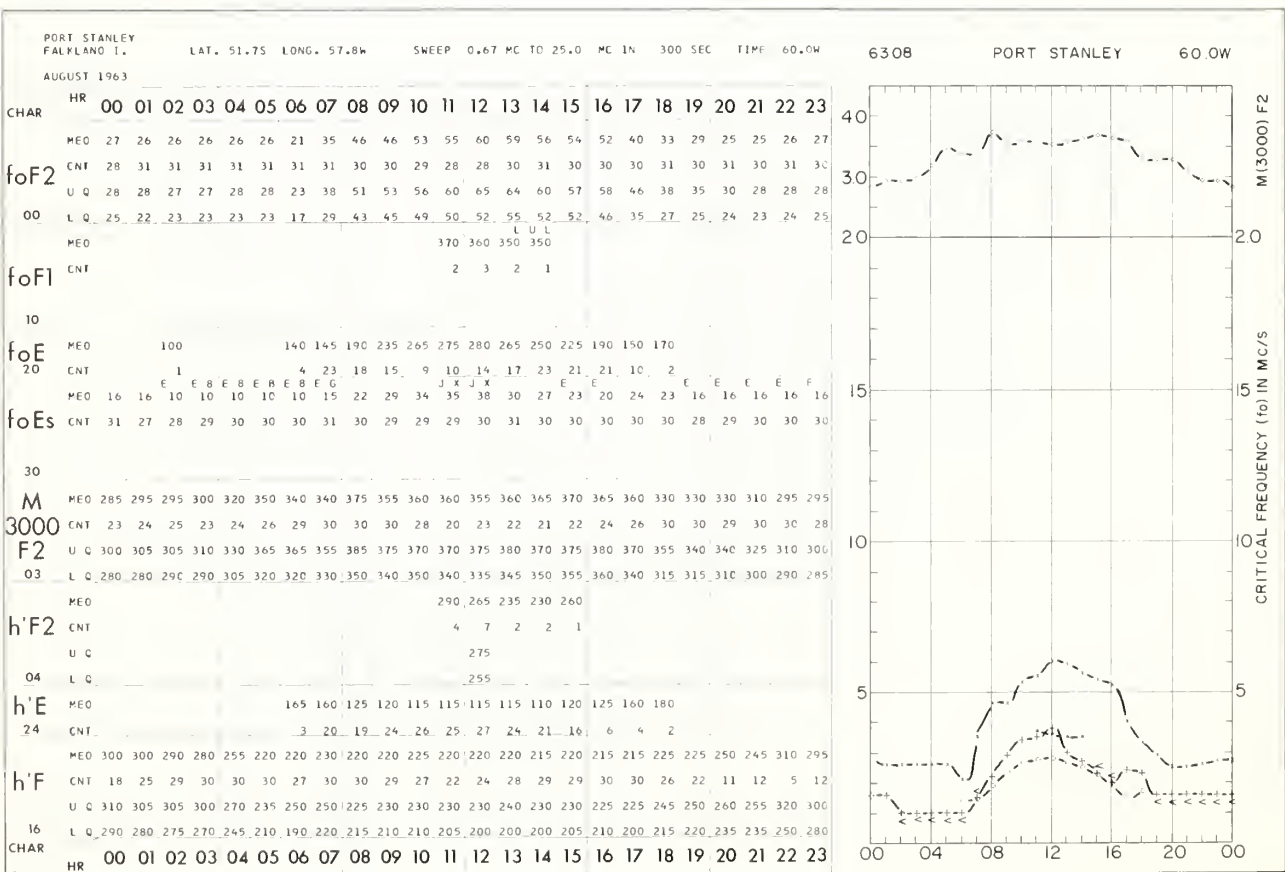
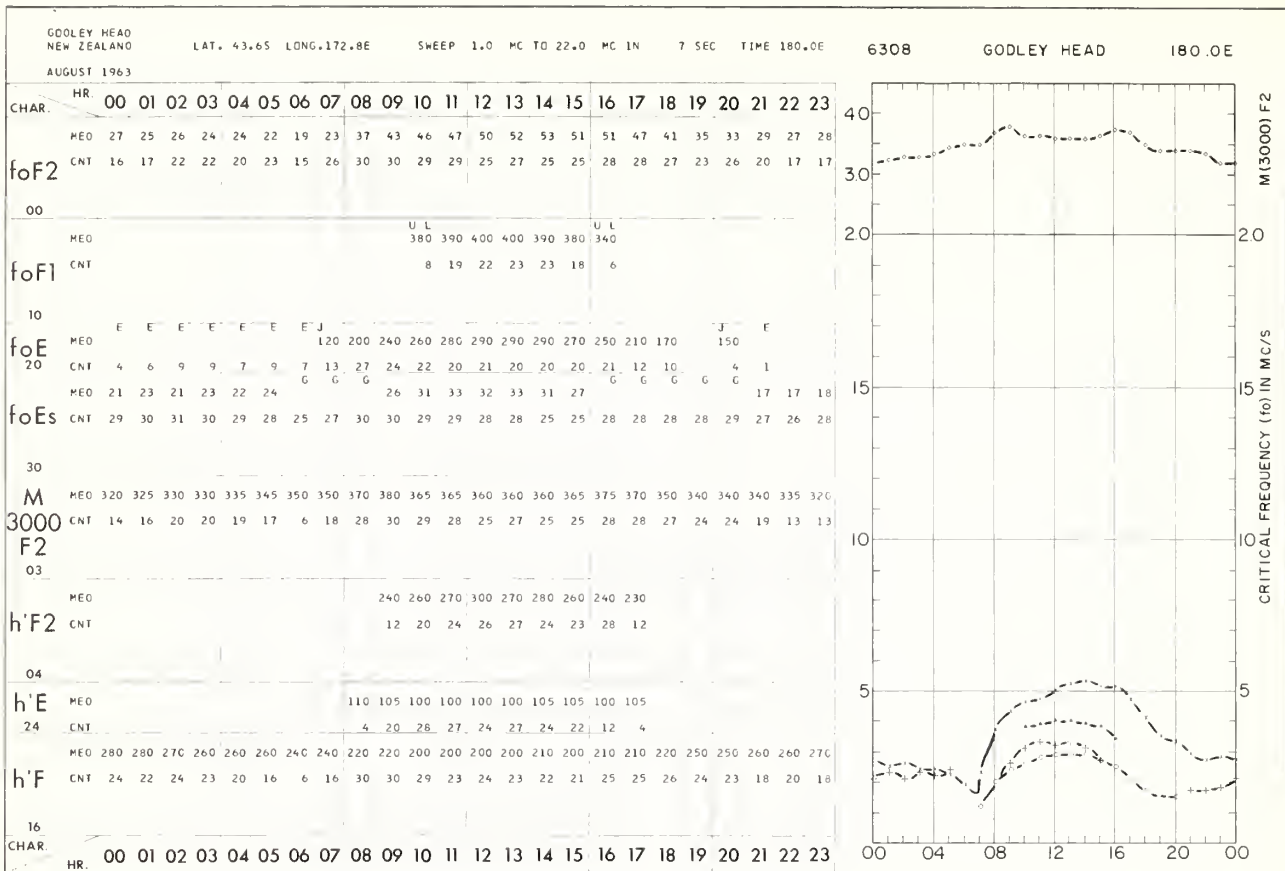












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## CRPL REPORTS

(A detailed list of CRPL publications is available from the Central Radio Propagation Laboratory on request.)

### Catalog of Data.

A catalog of records and data on file at the U.S. IGY World Data Center A for Airglow and Ionosphere, Boulder Laboratories, National Bureau of Standards, Boulder, Colorado, which includes a fee schedule to cover the cost of supplying copies, is available upon request.

CRPL-F (Part A), "Ionospheric Data."

CRPL-F (Part B), "Solar Geophysical Data."

These monthly bulletins have limited distribution and are sent, in general, only to those individuals and scientific organizations that collaborate in the exchange of ionospheric, solar, geomagnetic, or other radio propagation data of interest to the CRPL. Others may purchase copies of the same data from the U.S. IGY World Data Center A for Airglow and Ionosphere, National Bureau of Standards, Boulder, Colorado.

### "Ionospheric Predictions."

This series of publications is issued monthly, three months in advance, as an aid in determining the best sky-wave frequencies for high frequency communications over any transmission path, at any time of day for average conditions for the month.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price 15 cents. Annual subscription (12 issues) \$1.50 (50 cents additional for foreign mailing).

(NOTE: Tested sets of punched cards of the predicted numerical coefficients of numerical maps of the Ionospheric Predictions, for use with electronic computers, may be purchased by arrangement with the Prediction Services Section, CRPL, Boulder Laboratories, Boulder, Colorado.)

National Bureau of Standards Handbook 90, "Handbook for CRPL Ionospheric Predictions Based on Numerical Methods of Mapping." Price 40 cents.

National Bureau of Standards Circular 462, "Ionospheric Radio Propagation." Price \$1.25.

NBS Handbook 90 and NBS Circular 462 for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

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